

MEMO

DATE March 15, 2024 **PROJECT NO.** 1419-4679
RE 66 Thomas Street - Floodplain Analysis
City of Mississauga

TO Maricris Marinas, M.Sc., Planner
FROM Harrison Knill, P.Eng., Rebecca Archer, P.Eng.
CC Sandro De Zen (De Zen Realty Company)
James Lethbridge (Lethbridge Planning)

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by De Zen Realty Company Ltd. to complete a Floodplain Analysis for the site located at 66 Thomas Street, in the City of Mississauga. A section of Mullet Creek flows from north to south along the eastern portion of the property. The subject property is located within the existing Regional floodplain associated with Mullet Creek and is regulated by Credit Valley Conservation (CVC); therefore, a floodplain analysis is required to support the proposed development. The purpose of this memo is to summarize the results of the floodplain analysis.

This is the third submission of this memo which has been updated to address the CVC comments received to date.

2.0 Background

The subject property is approximately 2.78 ha in area and is located in an area of existing residential and commercial developments. The site currently features commercial structures, a paved parking lot and storage areas. At this time, the commercial businesses are active. The property is bound by Joymar Drive to the west, Thomas Street to the south, Tannery Street to the north, and Mullet Creek to the east.

The proposed development proposes 1026 units, three levels of underground parking, an internal road network, landscaped areas, and re-naturalized areas adjacent to Mullet Creek.

3.0 Methodology

The following tasks were completed in preparation of the floodplain analysis for the development:

- Submitted Crozier original Hydraulic Assessment Memo (June 21, 2019) and received CVC comments (December 23, 2019).
- Created an updated Existing Conditions HEC-RAS model based on a detailed topographic survey and using the flows regime from the CVC HEC-2 model. This model was sent to CVC for review (September 17, 2020) and then subsequently updated by Crozier. CVC provided additional modeling criteria on December 23, 2020, and further clarification in a meeting with Crozier on February 9, 2021.
- Prepared a Proposed Conditions HEC-RAS model, based on the Existing Conditions HEC-RAS model, to reflect the proposed grading plan for the proposed site re-development.
- Delineated the existing and proposed floodplain extents on associated figures.
- Through ongoing coordination with the CVC, a third iteration of the floodplain analysis was completed in HEC-RAS to address the CVC's comments and concerns.

4.0 Terms of Reference

The following summarizes the flood hazard criteria established for this site through discussions with CVC:

- A 5.0 m setback from the proposed conditions Regulatory floodline to the development limits of the site is required.
- Freeboard depth of minimum 0.3 m from the proposed condition Regulatory floodplain elevation to the proposed landform flood protection is required.
- Flood Storage balance for all storm events.
- No impacts to floodplain elevations or velocities upstream or downstream of the site.
- Safe access/egress can be provided for the site from Joymar Drive and Tannery Street.

5.0 Hydraulic Analysis

5.1 Existing Conditions

Crozier created an existing conditions (HEC-RAS) hydraulic model for the section of Mullet Creek intersecting the site.

The existing conditions HEC-RAS model was created by Crozier with input from CVC. A draft version of existing conditions HEC-RAS model was submitted to and reviewed by CVC (August 4, 2020). The CVC had responded with a revised model on September 17th, 2020 which had included the following changes.

- Interpolated cross-sections removed.
- Levees removed.
- Model parameters adjusted according to CVC standards.
- Manning's n values revised in all cross-sections according to the CVC's ELC land use layer.
- Pressure/Weir option enabled for high flow method in bridge modelling.
- Ineffective flow zones adjusted between Tannery St. and Thomas St. based on revised model existing output.
- Simulation type changed to mixed flow regime.
- Downstream boundary condition (known water level) checked against original HEC-2 model output and found insignificant differences. Boundary condition in the model for mixed flow simulation maintained.

Additional changes were made by Crozier to the existing conditions model the CVC had provided on September 17th, 2020, and the changes made to each cross-section are summarized below.

- 2198; vertical datum adjustment of 0.521 m
- 1557; vertical datum adjustment of 0.521 m from station 0 – 100.3
- 1501; intermediate points introduced throughout low flow portion of channel. Vertical datum adjustment of 0.521 m
- 1270; no changes
- 1165; no changes
- 976; no changes
- 944; no changes
- 914; no changes
- 746.7; vertical datum adjustment of 0.521 m from station 225 – 235.7
- 684.9; vertical datum adjustment of 0.521 m from station 221.7 -236.3
- 642; vertical datum adjustment of 0.521 m from station 217.3 – 223.8

- 546; vertical datum adjustment of 0.521 m from station 213.7 – 226
- 503.8; DEM data used from station 222.8 – 335 and vertical datum adjustment of 0.521 m applied
- 434; missing data from station 219.67 – 301, DEM data used from station 220.5 – 348.6 and vertical datum adjustment of 0.521 m applied.
- 323; Cross-section doesn't exist in CVC model (September 2020) DEM data used in model and vertical datum adjustment of 0.521 m applied
- 241; Cross-section doesn't exist in CVC model (September 2020) DEM data used in model and vertical datum adjustment of 0.521 m applied
- 133; vertical datum adjustment of 0.521 m applied

The changes summarized above are noted in the description of each cross-section within the existing conditions HEC-RAS model. The existing conditions HEC-RAS model geometry was created with a detailed topographic survey of the Site (David B. Searles Surveying Ltd. April 2018) and supplemented with the 2015 Digital Elevation Model (DEM) from the Southwestern Ontario Orthophotography Project (SWOOP) maintained by the Ministry of Natural Resources and Forestry. The location of HEC-RAS cross sections was chosen to accurately capture changes in site conditions, specifically to accurately represent the existing buildings located within the floodplain.

The following details were taken from the CVC existing conditions HEC-2 model and used in the existing conditions HEC-RAS model:

- The culverts dimensions at the Tanner Street and Thomas Street crossings
- Flow rates and flow change locations (River 1 Reach 4: River Stations 54 and 40)
- Downstream boundary condition, known water surface elevations for each profile flow rate at River Station 40

To account for the floodplain extending along Joymar Drive, a 3:1 slope was introduced to cross-sections at River Stations 944 to 503.8 at the property boundary along Joymar Drive.

The existing conditions flooding limits are delineated and illustrated on Figure 1. Figure 1 shows the CVC existing conditions HEC-2 model floodline and the CFCA existing conditions HEC-RAS model floodline. The CFCA existing conditions HEC-RAS model flood elevations for Mullet Creek are summarized in Table 1. Detailed HEC-RAS output is attached to this memo.

5.2 Proposed Conditions

A CFCA proposed conditions HEC-RAS model was created based on the CFCA existing conditions HEC-RAS model and updated using the proposed grading plan for the development.

The proposed conditions regularize the Regional floodplain while maintaining the existing flooding conditions to the greatest extent possible. Filling of the site to create a landform is proposed to floodproof the development and provide a minimum of 0.30 m between the Regional flood elevation and the top of fill slope for the development. To match existing flood storage, free draining storage depressions within the overbanks were proposed to maintain existing storage volumes. The proposed grading can be seen in Drawing C703, and the associated HEC-RAS cross-sections are attached with this memo. The proposed conditions Regional and 100-year floodlines are shown on Figure 2.

As illustrated on Drawing C703 and the attached HEC-RAS cross-sections, the proposed cut/fill scenario involves a small amount of cut adjacent to the top of bank. This is necessary to maintain positive drainage towards the creek while maintaining a flood volume balance. The depth of cut at the top of bank also corresponds with the approximate thickness of the existing asphalt that currently extends to the top of bank. This asphalt will be removed, and the floodplain area will be re-instated and re-naturalized under proposed conditions. Through discussions with the geotechnical engineer, this small amount of cut at the top of bank could also decrease the erosion potential of the existing steep slope along Mullet Creek and could be supported from a geotechnical standpoint. To ensure the stability of the cut area within the floodplain, a slope stability analysis is required by a geotechnical engineer.

5.2.1 Water Surface Elevations

The CFCA existing conditions and CFCA proposed conditions Regional and 100-year flood elevations are highlighted in Table 1. The Regulatory floodline is the Regional event throughout the Site. Detailed HEC-RAS output is provided attached to this memo.

Table 1: Mullet Creek Regional and 100-Year Water Surface Elevations

River Station	Regional Water Surface Elevation (masl)			100-Year Water Surface Elevation (masl)		
	CFCA Existing	CFCA Proposed	Net Change - Ex. to Pr. CFCA	CFCA Existing	CFCA Proposed	Net Change - Ex. to Pr. CFCA
2198	157.99	157.96	-0.03	157.85	157.82	-0.03
1557	157.59	157.55	-0.04	157.46	157.42	-0.04
1540 (Tannery Street)						
1501	156.72	156.61	-0.11	156.58	156.48	-0.10
1270	156.60	156.53	-0.07	156.43	156.39	-0.04
1165	155.98	156.08	0.10	155.89	155.95	0.06
976	155.57	155.58	0.01	155.53	155.52	-0.01
944	155.69	155.67	-0.02	155.63	155.59	-0.04
914	155.45	155.35	-0.10	155.44	155.25	-0.19
746.7	155.11	155.07	-0.04	155.37	155.01	-0.36
684.9	154.90	154.93	0.03	154.38	154.77	0.39
642	154.51	154.57	0.06	153.97	154.37	-0.6
546	154.10	153.48	-0.62	154.10	154.08	-
503.8	154.40	154.38	0.02	154.30	154.27	0.03
480 (Thomas Street)						
434	154.06	154.06	-	153.89	153.89	-
323	153.93	153.93	-	153.80	153.80	-
241	153.89	153.89	-	153.75	153.75	-
133	153.59	153.59	-	153.36	153.36	-

As shown in Table 1, there are no adverse impacts to Regulatory floodplain elevations upstream or downstream of the site. Within the site, all Regulatory floodplain elevations decrease or remain within 10 cm of existing conditions. However, where the water elevations increase above existing conditions the Regional water level is confined within the channel and does not have adverse impacts to the neighbouring properties. There are some areas where proposed conditions 100-year water elevations increase above the existing conditions water level (maximum of 0.39 m); however, the 100-Year water level is confined within the channel and does not cause any adverse impacts to neighbouring properties.

5.2.2 Floodway Velocities

An evaluation of floodway velocities was also undertaken. Based on the model results, floodway velocities in the 100-year and Regional storm events range from 1 to 5 meters per second and remain in this range under proposed conditions. As shown in Table 2, there are minor changes (< 0.02 m/s) to the velocity upstream at station 1557 and no changes downstream of the Site.

Table 2: Mullet Creek Regional and 100-year Event Velocities

River Station	Regional Velocity (m/s)			100-Year Velocity (m/s)		
	CFCA Existing	CFCA Proposed	Net Change - Ex. to Pr. CFCA	CFCA Existing	CFCA Proposed	Net Change - Ex. to Pr. CFCA
2198	0.75	0.76	0.01	0.73	0.73	-
1557	0.74	0.75	0.01	0.72	0.74	0.02
1540 (Tannery Street)						
1501	2.05	2.25	0.2	1.98	2.17	0.19
1270	1.74	1.50	-0.24	1.87	1.48	0.29
1165	3.43	2.53	-0.90	3.27	2.54	-0.73
976	3.03	2.73	-0.30	2.82	2.62	-0.2
944	2.21	1.87	-0.34	2.09	1.81	-0.28
914	2.83	2.57	-0.26	2.60	2.63	0.03
746.7	2.44	2.02	-0.42	1.70	1.95	0.25
684.9	2.67	2.19	-0.48	4.37	2.37	-2.00
642	3.41	2.62	-0.79	4.72	3.08	-1.64
546	3.37	4.89	1.52	3.07	3.05	-0.02
503.8	1.09	1.21	0.12	1.23	1.37	0.34
480 (Thomas Street)						
434	1.40	1.40	-	1.79	1.79	-
323	1.71	1.71	-	1.77	1.77	-
241	1.63	1.63	-	1.72	1.72	-
133	2.33	2.33	-	2.74	2.74	-

5.2.3 Flood Storage

Flood storage is defined as the volume of water storage available in a stream corridor for a given discharge without the inclusion of the impact of man-made hydraulic structures (culverts, bridges, etc.). CVC criteria state that pre-development flood storage volumes for each design storm event must be maintained in post-development conditions. Additional HEC-RAS models were prepared with man-made hydraulic structures (culverts) removed to determine the existing and proposed flood storage. Detailed HEC-RAS outputs are attached to this memo for the additional scenarios.

Table 3 summarizes the overall flood storage details for each storm event. Additionally, as shown in Table 3, the available flood storage is maintained or increased for all design storm events in the post-development conditions, except for a small decrease for the 2-year storm event (-0.27%) which is considered a negligible change.

Table 3: Existing and Proposed Flood Storage (HEC-RAS)

Storm Event	Flood Storage (m ³)		
	CFCA Existing	CFCA Proposed	Net Change - Ex. to Pr.
Regional	23,420	23,460	40
100-year	19,510	20,310	800
50-year	17,750	18,310	560
25-year	14,450	15,100	650
10-year	10,530	11,130	600
5-year	9,750	10,130	380
2-year	7,340	7,320	-20

Notes: Flood storage measured in HEC-RAS between River Station 1501 and River Station 503.8

5.2.4 Setbacks

Due to the infill nature of the site, a 5 m development setback has been applied from the most constraining natural hazard (i.e. Floodplain or Long-Term Stable Top of Slope) to the proposed development limit. An additional internal 5 m development buffer is also incorporated within the proposed Site Plan. It is proposed to place restrictions on the 5 m buffer within the development site that does not allow any permanent or temporary structures and requires the maintenance of vegetation by the condominium corporation; passive recreation/use would be allowed.

6.0 Conclusions

We conclude that the floodplain analysis has been conducted through significant collaboration with the CVC and is in conformance with the required CVC criteria.

Through this analysis, we have sufficiently demonstrated that the proposed cut and fill within the floodplain will not cause adverse flooding impacts. The cut/fill design within the floodplain provides post- to-pre-development levels of flood storage for all storm events.

Should you have any questions, or require further information, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.



Harrison Knill, P.Eng.
Water Resources Engineer

C.F. CROZIER & ASSOCIATES INC.



Rebecca Archer, P.Eng.
Senior Project Engineer

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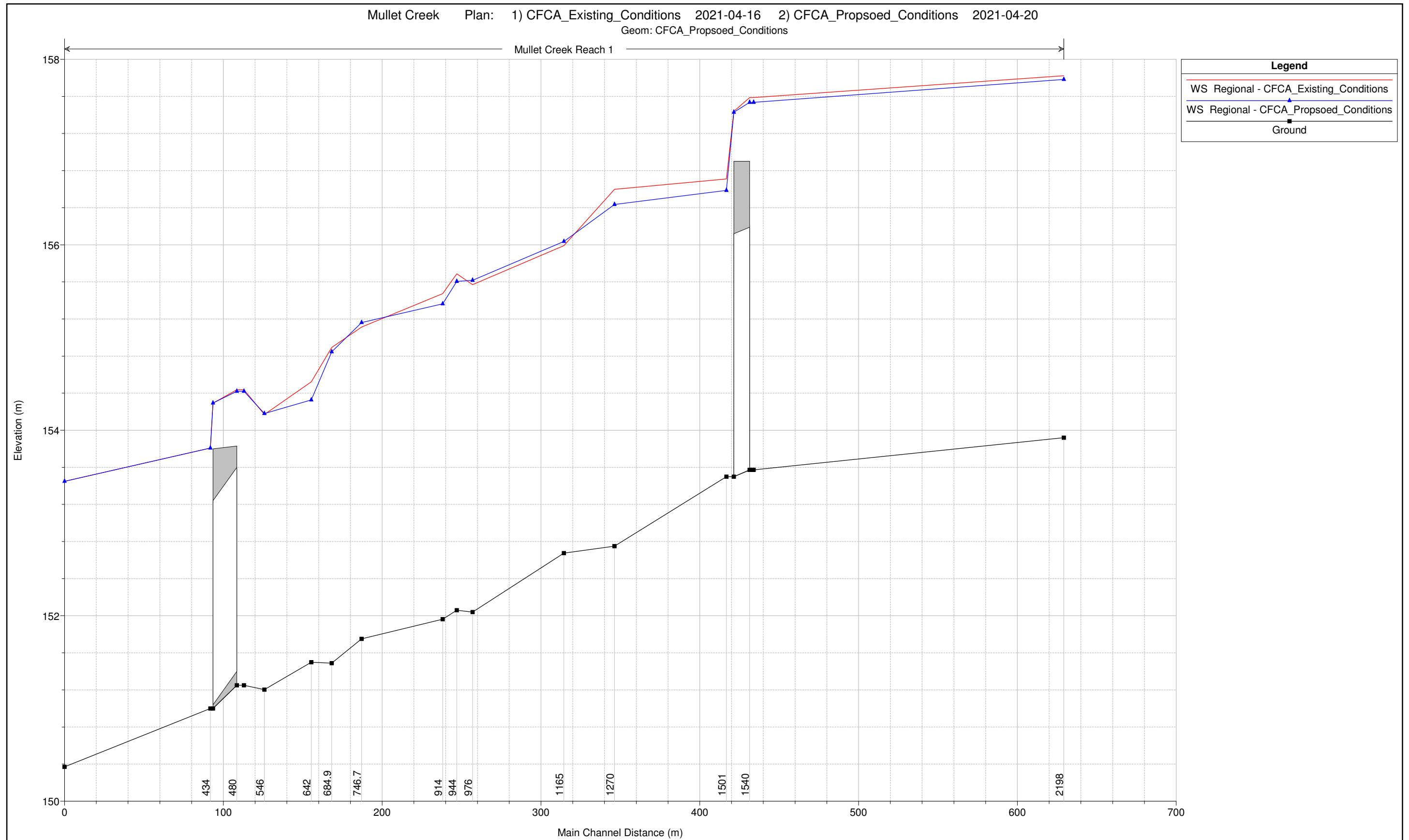
Attachments:

Figure 1: Existing Regulatory Floodplain and Related HEC-RAS Cross-Sections

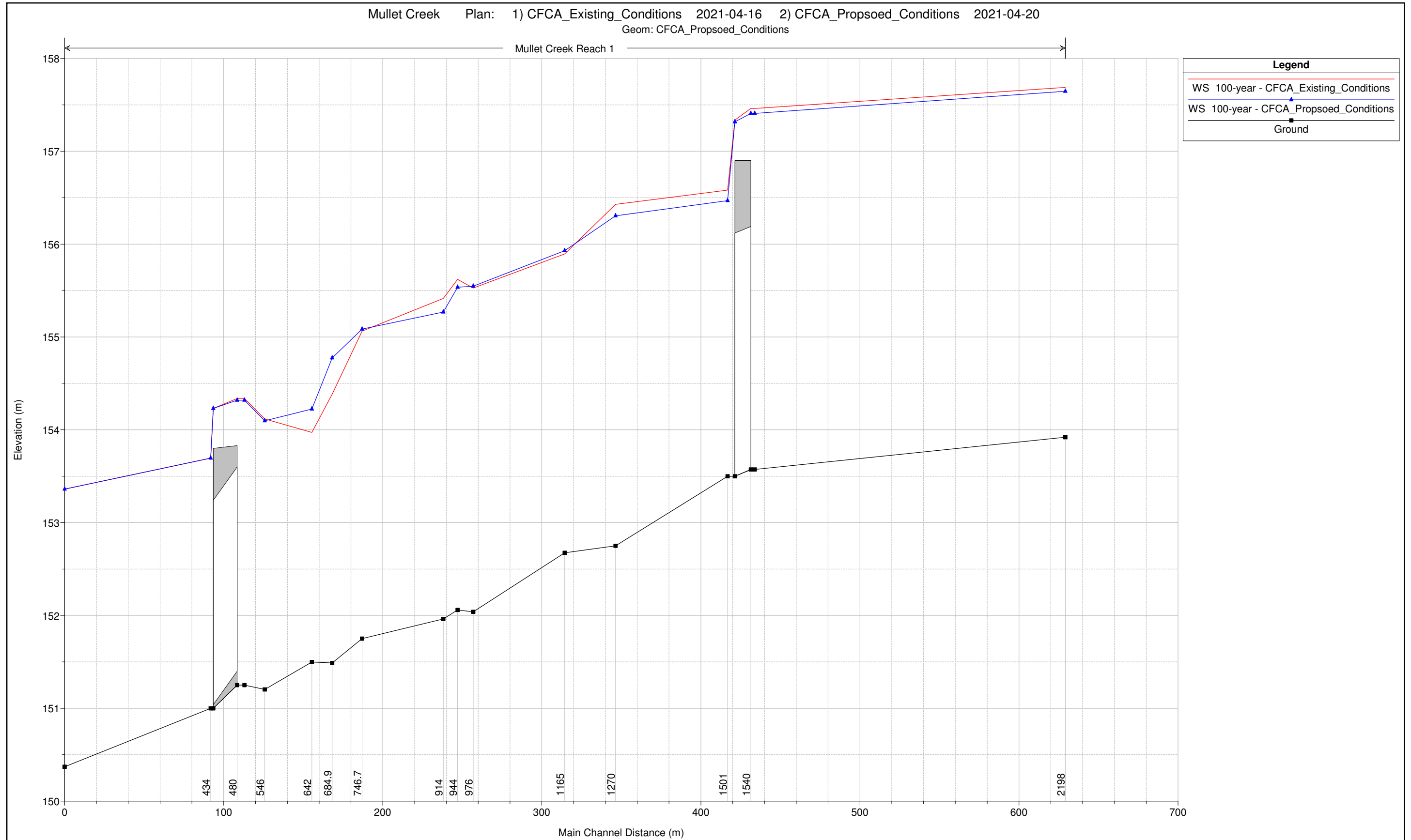
Figure 2: Proposed Regulatory Floodplain and Related HEC-RAS Cross-Sections

HEC-RAS Regional Profile Plot for Mullet Creek - Existing vs Proposed Conditions
HEC-RAS 100-Year Profile Plot for Mullet Creek - Existing vs Proposed Conditions
HEC-RAS Existing Conditions Profile Summary Table
HEC-RAS Existing Conditions Natural Channel Profile Summary Table
HEC-RAS Proposed Conditions Profile Summary Table
HEC-RAS Proposed Conditions Natural Channel Profile Summary Table
HEC-RAS Existing and Proposed Model Cross-Sections

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HES-RAS Profile Plot for Mullet Creek
 100-Year Profile Plot - Existing vs Proposed Conditions
 66 Thomas Street - HEC RAS Design (1419-4679)
 January 28, 2022
 Modeled by: JA



HES-RAS Output for Mullet Creek
Existing Conditions Profile Summary Table
66 Thomas Street - HES RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Existing_Conditions River: Mullet Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Reach 1	2198	Regional	113.00	153.92	157.82	155.51	157.85	0.000609	0.96	174.17	67.41	0.16
Reach 1	2198	100-year	103.00	153.92	157.69	155.46	157.71	0.000585	0.92	165.13	65.93	0.16
Reach 1	2198	50-year	92.40	153.92	157.53	155.41	157.55	0.000561	0.88	154.90	64.39	0.15
Reach 1	2198	25-year	79.60	153.92	157.29	155.34	157.31	0.000559	0.83	139.71	62.50	0.15
Reach 1	2198	10-year	59.60	153.92	156.69	155.21	156.71	0.000688	0.80	105.56	53.40	0.16
Reach 1	2198	5-year	54.70	153.92	156.55	155.18	156.57	0.000732	0.80	97.76	52.77	0.16
Reach 1	2198	2-year	36.30	153.92	155.99	155.03	156.00	0.000951	0.76	68.77	50.74	0.18
Reach 1	1557	Regional	113.00	153.57	157.59	155.72	157.64	0.007371	1.01	152.80	78.82	0.18
Reach 1	1557	100-year	103.00	153.57	157.46	155.60	157.51	0.007265	0.97	143.02	76.22	0.18
Reach 1	1557	50-year	92.40	153.57	157.31	155.47	157.35	0.007189	0.93	131.96	73.17	0.18
Reach 1	1557	25-year	79.60	153.57	157.07	155.31	157.11	0.007566	0.90	115.08	68.27	0.18
Reach 1	1557	10-year	59.60	153.57	156.28	155.04	156.45	0.018211	1.80	33.16	51.99	0.36
Reach 1	1557	5-year	54.70	153.57	156.13	154.96	156.29	0.018916	1.76	31.14	48.82	0.36
Reach 1	1557	2-year	36.30	153.57	155.52	154.67	155.65	0.022204	1.56	23.21	35.91	0.38
Reach 1	1540	Culvert										
Reach 1	1501	Regional	113.00	153.50	156.71	155.46	156.90	0.001422	1.96	59.55	30.26	0.37
Reach 1	1501	100-year	103.00	153.50	156.58	155.35	156.76	0.001388	1.87	56.01	25.52	0.37
Reach 1	1501	50-year	92.40	153.50	156.46	155.22	156.62	0.001308	1.76	53.02	23.85	0.35
Reach 1	1501	25-year	79.60	153.50	156.29	155.06	156.43	0.001230	1.63	49.10	22.41	0.34
Reach 1	1501	10-year	59.60	153.50	155.75	154.78	155.96	0.001708	2.02	29.44	20.16	0.43
Reach 1	1501	5-year	54.70	153.50	155.62	154.71	155.82	0.001749	1.97	27.76	19.76	0.43
Reach 1	1501	2-year	36.30	153.50	155.15	154.42	155.30	0.001773	1.68	21.62	18.32	0.42
Reach 1	1270	Regional	113.00	152.75	156.60		156.77	0.002528	1.97	64.99	71.91	0.41
Reach 1	1270	100-year	103.00	152.75	156.43		156.63	0.003016	2.08	55.30	51.02	0.45
Reach 1	1270	50-year	92.40	152.75	156.23		156.46	0.003630	2.22	45.60	45.05	0.50
Reach 1	1270	25-year	79.60	152.75	155.98		156.25	0.004175	2.31	35.92	33.46	0.54
Reach 1	1270	10-year	59.60	152.75	155.49		155.77	0.003821	2.33	25.59	14.79	0.57
Reach 1	1270	5-year	54.70	152.75	155.35		155.63	0.003800	2.33	23.50	14.22	0.58
Reach 1	1270	2-year	36.30	152.75	154.87		155.10	0.003951	2.12	17.08	12.33	0.58
Reach 1	1165	Regional	113.00	152.67	155.99	155.56	156.59	0.009543	3.42	33.00	32.15	0.74
Reach 1	1165	100-year	103.00	152.67	155.89	155.44	156.44	0.008765	3.27	31.54	29.30	0.72
Reach 1	1165	50-year	92.40	152.67	155.79	155.30	156.27	0.007891	3.08	29.96	18.16	0.69
Reach 1	1165	25-year	79.60	152.67	155.66	155.12	156.07	0.006727	2.83	28.12	15.96	0.65
Reach 1	1165	10-year	59.60	152.67	155.23	154.77	155.61	0.006419	2.71	22.02	13.74	0.68
Reach 1	1165	5-year	54.70	152.67	155.08	154.68	155.46	0.006484	2.75	19.89	13.02	0.71
Reach 1	1165	2-year	36.30	152.67	154.59	154.29	154.93	0.006788	2.57	14.13	10.95	0.72
Reach 1	976	Regional	113.00	152.04	155.57	155.08	156.07	0.007423	3.18	37.38	56.69	0.69
Reach 1	976	100-year	103.00	152.04	155.53	154.95	155.97	0.006540	2.98	36.35	56.60	0.65
Reach 1	976	50-year	92.40	152.04	155.47	154.81	155.85	0.005662	2.76	35.07	56.48	0.61
Reach 1	976	25-year	79.60	152.04	155.41	154.61	155.72	0.004556	2.47	33.67	55.56	0.55
Reach 1	976	10-year	59.60	152.04	154.99	154.28	155.27	0.004420	2.34	25.43	14.62	0.57
Reach 1	976	5-year	54.70	152.04	154.85	154.18	155.12	0.004127	2.34	23.41	13.90	0.57
Reach 1	976	2-year	36.30	152.04	154.36	153.78	154.59	0.003785	2.11	17.18	11.93	0.56
Reach 1	944	Regional	113.00	152.06	155.69	155.23	155.94	0.003806	2.33	51.09	58.40	0.49
Reach 1	944	100-year	103.00	152.06	155.62	155.02	155.86	0.003537	2.23	48.88	58.26	0.48
Reach 1	944	50-year	92.40	152.06	155.55	154.67	155.76	0.003236	2.12	46.42	58.09	0.46
Reach 1	944	25-year	79.60	152.06	155.46	154.49	155.64	0.002776	1.95	43.70	57.92	0.43
Reach 1	944	10-year	59.60	152.06	154.99	154.16	155.21	0.003279	2.11	29.26	28.69	0.50
Reach 1	944	5-year	54.70	152.06	154.84	154.07	155.07	0.003197	2.14	25.89	21.72	0.52
Reach 1	944	2-year	36.30	152.06	154.35	153.69	154.54	0.003049	1.93	18.78	12.81	0.51
Reach 1	914	Regional	113.00	151.96	155.47	155.40	155.88	0.010221	2.92	40.72	73.17	0.68
Reach 1	914	100-year	103.00	151.96	155.42	155.33	155.79	0.009744	2.82	38.60	73.01	0.67
Reach 1	914	50-year	92.40	151.96	155.35	154.87	155.70	0.009201	2.71	36.18	72.82	0.65
Reach 1	914	25-year	79.60	151.96	155.32	154.68	155.60	0.007314	2.41	35.14	72.74	0.58
Reach 1	914	10-year	59.60	151.96	154.79	154.36	155.16	0.007202	2.70	22.06	19.14	0.69
Reach 1	914	5-year	54.70	151.96	154.64	154.27	155.02	0.006891	2.72	20.11	13.48	0.71
Reach 1	914	2-year	36.30	151.96	154.14	153.88	154.49	0.006982	2.61	13.93	11.27	0.75
Reach 1	746.7	Regional	113.00	151.75	155.11	155.11	155.47	0.005705	2.85	46.24	54.73	0.65
Reach 1	746.7	100-year	103.00	151.75	155.06	155.06	155.40	0.005458	2.77	43.46	54.63	0.64
Reach 1	746.7	50-year	92.40	151.75	155.06	154.48	155.34	0.004409	2.49	43.38	54.63	0.58
Reach 1	746.7	25-year	79.60	151.75	154.37	154.28	155.12	0.010280	3.82	20.83	12.16	0.93
Reach 1	746.7	10-year	59.60	151.75	153.92	153.92	154.66	0.012297	3.79	15.72	10.67	1.00
Reach 1	746.7	5-year	54.70	151.75	153.82	153.82	154.53	0.012500	3.73	14.66	10.33	1.00
Reach 1	746.7	2-year	36.30	151.75	153.41	153.41	154.00	0.013136	3.41	10.64	8.96	1.00

HES-RAS Output for Mullet Creek
Existing Conditions Profile Summary Table
66 Thomas Street - HES RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Existing_Conditions River: Mullet Creek Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Reach 1	684.9	Regional	113.00	151.49	154.89	154.98	155.33	0.009069	3.13	41.93	77.39	0.67
Reach 1	684.9	100-year	103.00	151.49	154.38	154.38	155.35	0.017757	4.36	23.63	12.18	1.00
Reach 1	684.9	50-year	92.40	151.49	154.22	154.22	155.15	0.016507	4.25	21.72	11.74	1.00
Reach 1	684.9	25-year	79.60	151.49	154.02	154.02	154.88	0.014784	4.12	19.34	11.17	1.00
Reach 1	684.9	10-year	59.60	151.49	153.61	153.65	154.41	0.013413	3.97	15.00	10.06	1.04
Reach 1	684.9	5-year	54.70	151.49	153.51	153.55	154.28	0.013614	3.90	14.01	9.78	1.04
Reach 1	684.9	2-year	36.30	151.49	153.17	153.14	153.74	0.011937	3.33	10.91	8.85	0.96
Reach 1	642	Regional	113.00	151.50	154.52	154.66	155.17	0.010451	3.65	33.64	50.96	0.81
Reach 1	642	100-year	103.00	151.50	153.97	154.18	155.11	0.018290	4.72	21.84	13.05	1.16
Reach 1	642	50-year	92.40	151.50	153.83	154.03	154.92	0.016731	4.63	19.97	12.55	1.17
Reach 1	642	25-year	79.60	151.50	153.65	153.84	154.67	0.016243	4.46	17.84	11.96	1.17
Reach 1	642	10-year	59.60	151.50	153.36	153.50	154.22	0.015966	4.10	14.54	10.97	1.14
Reach 1	642	5-year	54.70	151.50	153.30	153.41	154.10	0.015457	3.96	13.82	10.75	1.11
Reach 1	642	2-year	36.30	151.50	153.02	153.02	153.58	0.012895	3.31	10.97	9.80	1.00
Reach 1	546	Regional	113.00	151.20	154.17	153.79	154.71	0.012521	3.25	34.97	21.66	0.76
Reach 1	546	100-year	103.00	151.20	154.12	153.67	154.59	0.011265	3.05	33.85	20.32	0.72
Reach 1	546	50-year	92.40	151.20	154.07	153.53	154.47	0.009639	2.82	32.83	18.99	0.67
Reach 1	546	25-year	79.60	151.20	153.90	153.35	154.26	0.008645	2.66	29.95	17.38	0.65
Reach 1	546	10-year	59.60	151.20	153.47	153.05	153.82	0.007851	2.60	22.93	15.28	0.68
Reach 1	546	5-year	54.70	151.20	153.35	152.97	153.69	0.007651	2.60	21.04	14.69	0.69
Reach 1	546	2-year	36.30	151.20	152.87	152.62	153.19	0.006767	2.50	14.51	12.51	0.74
Reach 1	503.8	Regional	113.00	151.25	154.44	153.37	154.48	0.000755	1.12	137.46	236.63	0.23
Reach 1	503.8	100-year	103.00	151.25	154.34	153.27	154.39	0.000974	1.24	116.64	227.74	0.25
Reach 1	503.8	50-year	92.40	151.25	154.23	153.15	154.30	0.001217	1.35	96.20	201.13	0.28
Reach 1	503.8	25-year	79.60	151.25	153.97	153.01	154.13	0.002521	1.85	52.36	128.19	0.41
Reach 1	503.8	10-year	59.60	151.25	153.51	152.77	153.71	0.002470	1.99	29.88	18.73	0.47
Reach 1	503.8	5-year	54.70	151.25	153.39	152.70	153.58	0.002607	1.96	27.92	18.31	0.48
Reach 1	503.8	2-year	36.30	151.25	152.91	152.40	153.07	0.003367	1.80	20.22	16.46	0.51
Reach 1	480		Culvert									
Reach 1	434	Regional	113.00	151.00	153.81	153.09	154.14	0.007139	2.56	45.65	53.37	0.59
Reach 1	434	100-year	103.00	151.00	153.70	152.98	154.01	0.006877	2.48	41.55	27.30	0.58
Reach 1	434	50-year	92.40	151.00	153.62	152.87	153.89	0.006102	2.33	39.68	22.16	0.56
Reach 1	434	25-year	79.60	151.00	153.44	152.73	153.69	0.005567	2.22	35.90	21.24	0.54
Reach 1	434	10-year	59.60	151.00	153.09	152.49	153.33	0.002905	2.15	27.70	19.45	0.53
Reach 1	434	5-year	54.70	151.00	153.02	152.43	153.24	0.002799	2.06	26.61	19.07	0.51
Reach 1	434	2-year	36.30	151.00	152.71	152.15	152.85	0.002497	1.69	21.53	17.49	0.47
Reach 1	133	Regional	134.00	150.37	153.45	153.10	153.60	0.002449	1.95	89.42	132.42	0.40
Reach 1	133	100-year	113.00	150.37	153.36	152.63	153.49	0.002241	1.82	80.95	127.70	0.38
Reach 1	133	50-year	102.00	150.37	153.31	152.48	153.43	0.002104	1.74	76.36	124.90	0.37
Reach 1	133	25-year	88.00	150.37	153.09	152.31	153.26	0.002962	1.93	57.52	106.86	0.43
Reach 1	133	10-year	65.50	150.37	152.85	151.98	153.01	0.003153	1.83	40.11	55.86	0.44
Reach 1	133	5-year	59.70	150.37	152.79	151.90	152.94	0.003002	1.74	37.20	43.19	0.42
Reach 1	133	2-year	40.20	150.37	152.51	151.59	152.61	0.002311	1.43	28.86	25.79	0.37

HES-RAS Output for Mullet Creek
Existing Conditions Natural Channel Profile Summary Table
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Existing_Conditions_NAT River: Mullet Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Volume (1000 m3)
Reach 1	2198	Regional	113.00	153.92	157.41	155.51	157.45	0.000972	1.13	147.11	63.44	0.20	48.90
Reach 1	2198	100-year	103.00	153.92	157.27	155.46	157.30	0.000966	1.09	138.19	62.33	0.20	43.58
Reach 1	2198	50-year	92.40	153.92	157.12	155.41	157.15	0.000947	1.04	129.07	61.34	0.19	40.28
Reach 1	2198	25-year	79.60	153.92	156.91	155.34	156.94	0.000895	0.97	117.18	54.43	0.19	34.67
Reach 1	2198	10-year	59.60	153.92	156.50	155.21	156.53	0.000935	0.89	95.48	52.62	0.18	26.12
Reach 1	2198	5-year	54.70	153.92	156.39	155.18	156.41	0.000958	0.87	89.58	52.22	0.19	24.16
Reach 1	2198	2-year	36.30	153.92	155.96	155.03	155.98	0.001020	0.78	67.23	50.62	0.18	17.56
Reach 1	1557	Regional	113.00	153.57	157.01		157.09	0.016789	1.32	110.80	66.96	0.27	25.05
Reach 1	1557	100-year	103.00	153.57	156.87		156.95	0.017344	1.29	101.68	64.10	0.27	21.38
Reach 1	1557	50-year	92.40	153.57	156.73		156.81	0.017524	1.25	92.95	61.23	0.27	19.72
Reach 1	1557	25-year	79.60	153.57	156.54		156.61	0.018027	1.19	81.72	57.34	0.27	16.23
Reach 1	1557	10-year	59.60	153.57	156.12		156.18	0.022999	1.15	59.17	48.58	0.29	11.75
Reach 1	1557	5-year	54.70	153.57	155.99		156.06	0.025169	1.15	53.36	46.13	0.29	10.86
Reach 1	1557	2-year	36.30	153.57	155.54		155.60	0.033455	1.08	34.49	36.23	0.31	8.07
Reach 1	1501	Regional	113.00	153.50	156.71		156.90	0.001422	1.96	59.55	30.26	0.37	23.50
Reach 1	1501	100-year	103.00	153.50	156.58		156.76	0.001388	1.87	56.01	25.52	0.37	19.96
Reach 1	1501	50-year	92.40	153.50	156.46		156.62	0.001308	1.76	53.02	23.86	0.35	18.40
Reach 1	1501	25-year	79.60	153.50	156.29		156.43	0.001230	1.63	49.10	22.41	0.34	15.06
Reach 1	1501	10-year	59.60	153.50	155.84		155.96	0.001349	1.51	39.52	20.52	0.35	10.88
Reach 1	1501	5-year	54.70	153.50	155.71		155.82	0.001398	1.49	36.74	20.03	0.35	10.07
Reach 1	1501	2-year	36.30	153.50	155.20		155.29	0.001459	1.35	26.92	18.46	0.36	7.54
Reach 1	1270	Regional	113.00	152.75	156.60		156.77	0.002528	1.97	64.99	71.91	0.41	19.45
Reach 1	1270	100-year	103.00	152.75	156.43		156.63	0.003016	2.08	55.30	51.02	0.45	16.26
Reach 1	1270	50-year	92.40	152.75	156.23		156.46	0.003629	2.22	45.60	45.05	0.50	15.05
Reach 1	1270	25-year	79.60	152.75	155.98		156.25	0.004175	2.31	35.92	33.46	0.54	12.10
Reach 1	1270	10-year	59.60	152.75	155.49		155.77	0.003821	2.33	25.59	14.79	0.57	8.58
Reach 1	1270	5-year	54.70	152.75	155.35		155.63	0.003800	2.33	23.50	14.22	0.58	7.95
Reach 1	1270	2-year	36.30	152.75	154.87		155.10	0.003951	2.12	17.08	12.33	0.58	5.99
Reach 1	1165	Regional	113.00	152.67	155.99	155.56	156.59	0.009543	3.42	33.00	32.15	0.74	17.51
Reach 1	1165	100-year	103.00	152.67	155.89	155.44	156.44	0.008765	3.27	31.54	29.30	0.72	14.64
Reach 1	1165	50-year	92.40	152.67	155.79	155.30	156.27	0.007891	3.08	29.96	18.16	0.69	13.73
Reach 1	1165	25-year	79.60	152.67	155.66	155.12	156.07	0.006727	2.83	28.12	15.96	0.65	11.05
Reach 1	1165	10-year	59.60	152.67	155.23	154.77	155.61	0.006419	2.71	22.02	13.74	0.68	7.82
Reach 1	1165	5-year	54.70	152.67	155.08	154.68	155.46	0.006484	2.75	19.89	13.02	0.71	7.26
Reach 1	1165	2-year	36.30	152.67	154.59	154.29	154.93	0.006788	2.57	14.13	10.95	0.72	5.49
Reach 1	976	Regional	113.00	152.04	155.57	155.08	156.07	0.007423	3.18	37.38	56.69	0.69	15.19
Reach 1	976	100-year	103.00	152.04	155.53	154.95	155.97	0.006540	2.98	36.35	56.60	0.65	12.47
Reach 1	976	50-year	92.40	152.04	155.47	154.81	155.85	0.005661	2.76	35.07	56.48	0.61	11.72
Reach 1	976	25-year	79.60	152.04	155.41	154.61	155.72	0.004556	2.47	33.67	55.56	0.55	9.19
Reach 1	976	10-year	59.60	152.04	154.99	154.28	155.27	0.004420	2.34	25.43	14.62	0.57	6.46
Reach 1	976	5-year	54.70	152.04	154.85	154.18	155.12	0.004127	2.34	23.41	13.90	0.57	6.01
Reach 1	976	2-year	36.30	152.04	154.36	153.78	154.59	0.003785	2.11	17.18	11.93	0.56	4.59
Reach 1	944	Regional	113.00	152.06	155.69	155.23	155.94	0.003806	2.33	51.09	58.40	0.49	14.64
Reach 1	944	100-year	103.00	152.06	155.62	155.02	155.86	0.003537	2.23	48.88	58.26	0.48	11.95
Reach 1	944	50-year	92.40	152.06	155.55	154.67	155.76	0.003236	2.12	46.42	58.09	0.46	11.23
Reach 1	944	25-year	79.60	152.06	155.46	154.49	155.64	0.002776	1.95	43.70	57.92	0.43	8.75
Reach 1	944	10-year	59.60	152.06	154.99	154.16	155.21	0.003279	2.11	29.26	28.69	0.50	6.19
Reach 1	944	5-year	54.70	152.06	154.84	154.07	155.07	0.003197	2.14	25.89	21.72	0.52	5.77
Reach 1	944	2-year	36.30	152.06	154.35	153.69	154.54	0.003049	1.93	18.78	12.81	0.51	4.41
Reach 1	914	Regional	113.00	151.96	155.47	155.40	155.88	0.010221	2.92	40.72	73.17	0.68	14.09
Reach 1	914	100-year	103.00	151.96	155.42	155.33	155.79	0.009744	2.82	38.60	73.01	0.67	11.44
Reach 1	914	50-year	92.40	151.96	155.35	154.87	155.70	0.009196	2.71	36.18	72.82	0.65	10.76
Reach 1	914	25-year	79.60	151.96	155.32	154.68	155.60	0.007314	2.41	35.14	72.74	0.58	8.30
Reach 1	914	10-year	59.60	151.96	154.79	154.36	155.16	0.007202	2.70	22.06	19.14	0.69	5.96
Reach 1	914	5-year	54.70	151.96	154.64	154.27	155.02	0.006891	2.72	20.11	13.48	0.71	5.56
Reach 1	914	2-year	36.30	151.96	154.14	153.88	154.49	0.006982	2.61	13.93	11.27	0.75	4.27
Reach 1	746.7	Regional	113.00	151.75	155.11	155.11	155.47	0.005705	2.85	46.24	54.73	0.65	11.54
Reach 1	746.7	100-year	103.00	151.75	155.06	155.06	155.40	0.005458	2.77	43.46	54.63	0.64	9.05
Reach 1	746.7	50-year	92.40	151.75	155.06	154.48	155.34	0.004387	2.49	43.49	54.63	0.57	8.48
Reach 1	746.7	25-year	79.60	151.75	154.37	154.28	155.12	0.010280	3.82	20.83	12.16	0.93	6.60
Reach 1	746.7	10-year	59.60	151.75	153.92	153.92	154.66	0.012297	3.79	15.72	10.67	1.00	4.99
Reach 1	746.7	5-year	54.70	151.75	153.82	153.82	154.53	0.012500	3.73	14.66	10.33	1.00	4.67
Reach 1	746.7	2-year	36.30	151.75	153.41	153.41	154.00	0.013136	3.41	10.64	8.96	1.00	3.64
Reach 1	684.9	Regional	113.00	151.49	154.89	154.98	155.33	0.009069	3.13	41.93	77.39	0.67	10.74
Reach 1	684.9	100-year	103.00	151.49	154.38	154.38	155.35	0.017757	4.36	23.63	12.18	1.00	8.45
Reach 1	684.9	50-year	92.40	151.49	154.22	154.22	155.15	0.016507	4.25	21.72	11.74	1.00	7.90
Reach 1	684.9	25-year	79.60	151.49	154.02	154.02	154.88	0.014784	4.12	19.34	11.17	1.00	6.22
Reach 1	684.9	10-year	59.60	151.49	153.61	153.65	154.41	0.013413	3.97	15.00	10.06	1.04	4.70
Reach 1	684.9	5-year	54.70	151.49	153.51	153.55	154.28	0.013614	3.90	14.01	9.78	1.04	4.41
Reach 1	684.9	2-year	36.30	151.49	153.09	153.14	153.74	0.014334	3.56	10.21	8.62	1.04	3.44
Reach 1	642	Regional	113.00	151.50	154.52	154.66	155.17	0.010451	3.65	33.64	50.96	0.81	10.01
Reach 1	642	100-year	103.00	151.50	153.97	154.18	155.11	0.018290	4.72	21.84	13.05	1.16	8.16

HES-RAS Output for Mullet Creek
Existing Conditions Natural Channel Profile Summary Table
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFWA_Existing_Conditions_NAT River: Mullet Creek Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Volume (1000 m3)
Reach 1	642	50-year	92.40	151.50	153.83	154.03	154.92	0.016731	4.63	19.97	12.55	1.17	7.64
Reach 1	642	25-year	79.60	151.50	153.65	153.84	154.67	0.016243	4.46	17.84	11.96	1.17	5.98
Reach 1	642	10-year	59.60	151.50	153.36	153.50	154.22	0.015966	4.10	14.54	10.97	1.14	4.51
Reach 1	642	5-year	54.70	151.50	153.30	153.41	154.10	0.015457	3.96	13.82	10.75	1.11	4.23
Reach 1	642	2-year	36.30	151.50	153.02	153.02	153.58	0.012895	3.31	10.97	9.80	1.00	3.31
Reach 1	546	Regional	113.00	151.20	153.64	153.79	154.64	0.023234	4.42	25.54	16.05	1.12	9.01
Reach 1	546	100-year	103.00	151.20	153.72	153.67	154.47	0.017697	3.85	26.76	16.40	0.96	7.44
Reach 1	546	50-year	92.40	151.20	153.65	153.53	154.31	0.015306	3.59	25.74	16.10	0.91	6.96
Reach 1	546	25-year	79.60	151.20	153.18	153.35	154.11	0.019580	4.26	18.67	13.92	1.18	5.44
Reach 1	546	10-year	59.60	151.20	152.88	153.05	153.72	0.017561	4.05	14.71	12.59	1.20	4.08
Reach 1	546	5-year	54.70	151.20	152.81	152.97	153.61	0.017554	3.96	13.82	12.27	1.19	3.82
Reach 1	546	2-year	36.30	151.20	152.72	152.62	153.14	0.009665	2.85	12.75	11.87	0.88	2.96
Reach 1	503.8	Regional	113.00	151.25	154.20	153.40	154.30	0.002728	1.56	92.42	193.12	0.35	8.30
Reach 1	503.8	100-year	103.00	151.25	153.82	153.30	154.19	0.007704	2.74	40.20	61.36	0.64	7.02
Reach 1	503.8	50-year	92.40	151.25	153.72	153.18	154.08	0.007305	2.65	35.34	34.34	0.63	6.57
Reach 1	503.8	25-year	79.60	151.25	153.53	153.03	153.87	0.006928	2.55	31.25	18.83	0.63	5.12
Reach 1	503.8	10-year	59.60	151.25	153.25	152.77	153.52	0.005771	2.29	26.08	17.80	0.60	3.82
Reach 1	503.8	5-year	54.70	151.25	153.17	152.70	153.42	0.005515	2.23	24.55	17.46	0.60	3.57
Reach 1	503.8	2-year	36.30	151.25	152.78		152.98	0.004456	2.01	18.07	15.88	0.60	2.76
Reach 1	434	Regional	113.00	151.00	153.81	153.13	154.14	0.007139	2.56	45.65	53.37	0.59	6.87
Reach 1	434	100-year	103.00	151.00	153.70		154.01	0.006875	2.48	41.56	27.33	0.58	6.15
Reach 1	434	50-year	92.40	151.00	153.62		153.89	0.006102	2.33	39.68	22.16	0.56	5.78
Reach 1	434	25-year	79.60	151.00	153.44		153.69	0.005567	2.22	35.90	21.24	0.54	4.41
Reach 1	434	10-year	59.60	151.00	153.18		153.38	0.004391	1.95	30.50	19.97	0.50	3.22
Reach 1	434	5-year	54.70	151.00	153.10		153.28	0.004083	1.89	28.90	19.50	0.50	3.01
Reach 1	434	2-year	36.30	151.00	152.73		152.87	0.002918	1.64	22.13	17.60	0.47	2.33
Reach 1	133	Regional	134.00	150.37	153.45	153.10	153.60	0.002449	1.95	89.42	132.42	0.40	
Reach 1	133	100-year	113.00	150.37	153.36	152.63	153.49	0.002241	1.82	80.95	127.70	0.38	
Reach 1	133	50-year	102.00	150.37	153.31	152.48	153.43	0.002104	1.74	76.36	124.90	0.37	
Reach 1	133	25-year	88.00	150.37	153.09	152.31	153.26	0.002962	1.93	57.52	106.86	0.43	
Reach 1	133	10-year	65.50	150.37	152.85	151.98	153.01	0.003153	1.83	40.11	55.86	0.44	
Reach 1	133	5-year	59.70	150.37	152.79	151.90	152.94	0.003002	1.74	37.20	43.19	0.42	
Reach 1	133	2-year	40.20	150.37	152.51	151.59	152.61	0.002311	1.43	28.86	25.79	0.37	

HES-RAS Output for Mullet Creek
Proposed Conditions Profile Summary Table
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Proposed_Conditions River: Mullet Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Reach 1	2198	Regional	113.00	153.92	157.78	155.51	157.81	0.000635	0.98	171.47	66.96	0.16
Reach 1	2198	100-year	103.00	153.92	157.65	155.46	157.67	0.000612	0.94	162.41	65.50	0.16
Reach 1	2198	50-year	92.40	153.92	157.48	155.41	157.51	0.000592	0.89	151.98	64.03	0.16
Reach 1	2198	25-year	79.60	153.92	157.20	155.34	157.22	0.000629	0.87	134.12	61.89	0.16
Reach 1	2198	10-year	59.60	153.92	156.69	155.21	156.71	0.000691	0.80	105.43	53.39	0.16
Reach 1	2198	5-year	54.70	153.92	156.55	155.18	156.57	0.000732	0.80	97.76	52.77	0.16
Reach 1	2198	2-year	36.30	153.92	155.99	155.03	156.00	0.000953	0.76	68.73	50.73	0.18
Reach 1	1557	Regional	113.00	153.57	157.54	155.72	157.59	0.007899	1.03	148.77	77.76	0.19
Reach 1	1557	100-year	103.00	153.57	157.41	155.60	157.46	0.007816	1.00	139.01	75.13	0.19
Reach 1	1557	50-year	92.40	153.57	157.25	155.47	157.30	0.007818	0.96	127.71	71.97	0.19
Reach 1	1557	25-year	79.60	153.57	156.95	155.31	157.00	0.009087	0.96	107.08	65.81	0.20
Reach 1	1557	10-year	59.60	153.57	156.28	155.04	156.44	0.018306	1.80	33.11	51.91	0.36
Reach 1	1557	5-year	54.70	153.57	156.13	154.96	156.29	0.018918	1.76	31.14	48.82	0.36
Reach 1	1557	2-year	36.30	153.57	155.52	154.67	155.65	0.022264	1.57	23.19	35.85	0.38
Reach 1	1540	Culvert										
Reach 1	1501	Regional	113.00	153.50	156.59	155.46	156.80	0.001990	2.05	56.10	25.57	0.40
Reach 1	1501	100-year	103.00	153.50	156.47	155.35	156.66	0.001929	1.96	53.16	23.99	0.39
Reach 1	1501	50-year	92.40	153.50	156.35	155.22	156.52	0.001824	1.85	50.43	22.71	0.38
Reach 1	1501	25-year	79.60	153.50	156.10	155.06	156.38	0.001886	2.34	33.99	21.51	0.46
Reach 1	1501	10-year	59.60	153.50	155.74	154.78	155.95	0.001732	2.03	29.31	20.13	0.43
Reach 1	1501	5-year	54.70	153.50	155.62	154.71	155.82	0.001749	1.97	27.76	19.76	0.43
Reach 1	1501	2-year	36.30	153.50	155.15	154.42	155.29	0.001785	1.68	21.58	18.31	0.42
Reach 1	1270	Regional	113.00	152.75	156.43		156.63	0.002987	2.13	61.97	39.60	0.46
Reach 1	1270	100-year	103.00	152.75	156.30		156.50	0.003051	2.12	56.88	38.95	0.46
Reach 1	1270	50-year	92.40	152.75	156.16		156.36	0.003142	2.11	51.21	38.21	0.48
Reach 1	1270	25-year	79.60	152.75	155.97		156.17	0.003262	2.10	44.12	37.27	0.49
Reach 1	1270	10-year	59.60	152.75	155.52		155.77	0.003610	2.25	28.61	29.73	0.55
Reach 1	1270	5-year	54.70	152.75	155.35		155.63	0.003785	2.32	23.89	26.42	0.58
Reach 1	1270	2-year	36.30	152.75	154.86		155.09	0.004007	2.14	17.00	12.30	0.58
Reach 1	1165	Regional	113.00	152.67	156.04	155.67	156.45	0.007680	2.99	45.88	30.29	0.65
Reach 1	1165	100-year	103.00	152.67	155.93	155.56	156.33	0.007444	2.91	42.63	29.75	0.64
Reach 1	1165	50-year	92.40	152.67	155.81	155.43	156.19	0.007141	2.82	39.09	29.13	0.64
Reach 1	1165	25-year	79.60	152.67	155.67	155.19	156.01	0.006575	2.66	35.04	28.40	0.62
Reach 1	1165	10-year	59.60	152.67	155.24	154.77	155.60	0.007441	2.68	23.41	25.49	0.68
Reach 1	1165	5-year	54.70	152.67	155.07	154.68	155.46	0.006998	2.75	19.87	13.04	0.71
Reach 1	1165	2-year	36.30	152.67	154.58	154.29	154.92	0.006573	2.59	14.03	10.92	0.73
Reach 1	976	Regional	113.00	152.04	155.62	155.28	156.04	0.006525	2.99	47.34	40.08	0.65
Reach 1	976	100-year	103.00	152.04	155.55	154.96	155.94	0.006007	2.86	44.51	39.71	0.62
Reach 1	976	50-year	92.40	152.04	155.46	154.81	155.82	0.005507	2.72	41.00	39.24	0.60
Reach 1	976	25-year	79.60	152.04	155.37	154.61	155.68	0.004624	2.47	37.74	38.79	0.56
Reach 1	976	10-year	59.60	152.04	154.95	154.27	155.25	0.004302	2.39	24.94	14.40	0.58
Reach 1	976	5-year	54.70	152.04	154.83	154.18	155.11	0.003978	2.36	23.16	13.81	0.58
Reach 1	976	2-year	36.30	152.04	154.36	153.78	154.59	0.003785	2.11	17.18	11.93	0.56
Reach 1	944	Regional	113.00	152.06	155.61	154.94	155.97	0.005118	2.78	53.51	45.78	0.59
Reach 1	944	100-year	103.00	152.06	155.54	154.80	155.87	0.004699	2.65	50.30	45.42	0.57
Reach 1	944	50-year	92.40	152.06	155.45	154.66	155.75	0.004292	2.52	46.30	44.96	0.55
Reach 1	944	25-year	79.60	152.06	155.36	154.48	155.62	0.003583	2.29	42.63	44.54	0.50
Reach 1	944	10-year	59.60	152.06	154.94	154.16	155.19	0.003416	2.22	26.87	14.69	0.52
Reach 1	944	5-year	54.70	152.06	154.82	154.07	155.06	0.003208	2.18	25.10	14.24	0.52
Reach 1	944	2-year	36.30	152.06	154.35	153.69	154.54	0.003050	1.93	18.78	12.81	0.51
Reach 1	914	Regional	113.00	151.96	155.36	155.36	155.89	0.010741	3.35	44.40	50.68	0.78
Reach 1	914	100-year	103.00	151.96	155.27	155.27	155.79	0.010603	3.30	39.64	50.09	0.78
Reach 1	914	50-year	92.40	151.96	155.27	154.88	155.69	0.008524	2.96	39.66	50.09	0.70
Reach 1	914	25-year	79.60	151.96	155.25	154.69	155.57	0.006552	2.59	38.70	49.97	0.61
Reach 1	914	10-year	59.60	151.96	154.75	154.36	155.14	0.006800	2.76	21.58	13.95	0.71
Reach 1	914	5-year	54.70	151.96	154.62	154.27	155.01	0.006691	2.76	19.81	13.38	0.72
Reach 1	914	2-year	36.30	151.96	154.14	153.88	154.49	0.006982	2.61	13.93	11.27	0.75
Reach 1	746.7	Regional	113.00	151.75	155.16	154.94	155.39	0.004909	2.44	60.44	55.07	0.53
Reach 1	746.7	100-year	103.00	151.75	155.08	154.88	155.31	0.004842	2.40	56.23	54.58	0.53
Reach 1	746.7	50-year	92.40	151.75	155.16	154.81	155.32	0.003264	1.99	60.57	55.09	0.43
Reach 1	746.7	25-year	79.60	151.75	154.36	154.28	155.11	0.010936	3.84	21.01	32.26	0.94
Reach 1	746.7	10-year	59.60	151.75	153.92	153.92	154.66	0.012311	3.79	15.71	10.66	1.00
Reach 1	746.7	5-year	54.70	151.75	153.83	153.83	154.53	0.012455	3.73	14.68	10.34	1.00
Reach 1	746.7	2-year	36.30	151.75	153.41	153.41	154.00	0.013135	3.41	10.64	8.96	1.00

HES-RAS Output for Mullet Creek
Proposed Conditions Profile Summary Table
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Proposed_Conditions River: Mullet Creek Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Reach 1	684.9	Regional	113.00	151.49	154.85	154.85	155.27	0.007601	3.14	47.19	51.42	0.67
Reach 1	684.9	100-year	103.00	151.49	154.77	154.77	155.19	0.007375	3.07	43.52	50.98	0.66
Reach 1	684.9	50-year	92.40	151.49	154.22	154.22	155.15	0.014187	4.26	21.71	11.73	1.00
Reach 1	684.9	25-year	79.60	151.49	154.01	154.01	154.88	0.013423	4.13	19.29	11.16	1.00
Reach 1	684.9	10-year	59.60	151.49	153.61	153.65	154.41	0.013410	3.97	15.00	10.06	1.04
Reach 1	684.9	5-year	54.70	151.49	153.51	153.55	154.28	0.013624	3.91	14.01	9.78	1.04
Reach 1	684.9	2-year	36.30	151.49	153.17	153.13	153.74	0.011931	3.33	10.91	8.85	0.96
Reach 1	642	Regional	113.00	151.50	154.33	154.57	155.09	0.013510	3.98	34.05	50.05	0.94
Reach 1	642	100-year	103.00	151.50	154.22	154.50	155.01	0.013772	3.98	28.99	43.06	0.96
Reach 1	642	50-year	92.40	151.50	153.80	154.03	154.93	0.016799	4.70	19.66	12.47	1.20
Reach 1	642	25-year	79.60	151.50	153.64	153.84	154.67	0.016613	4.50	17.70	11.92	1.18
Reach 1	642	10-year	59.60	151.50	153.36	153.50	154.22	0.015968	4.10	14.54	10.97	1.14
Reach 1	642	5-year	54.70	151.50	153.30	153.41	154.10	0.015456	3.96	13.82	10.75	1.11
Reach 1	642	2-year	36.30	151.50	153.02	153.02	153.58	0.012853	3.31	10.98	9.80	1.00
Reach 1	546	Regional	113.00	151.20	154.18	153.79	154.67	0.009733	3.15	39.97	53.76	0.73
Reach 1	546	100-year	103.00	151.20	154.10	153.67	154.57	0.009418	3.06	35.57	53.30	0.73
Reach 1	546	50-year	92.40	151.20	154.04	153.53	154.46	0.008116	2.85	32.81	38.92	0.68
Reach 1	546	25-year	79.60	151.20	153.88	153.36	154.25	0.006931	2.70	29.51	17.22	0.66
Reach 1	546	10-year	59.60	151.20	153.46	153.05	153.81	0.006549	2.62	22.72	15.21	0.69
Reach 1	546	5-year	54.70	151.20	153.34	152.97	153.69	0.006621	2.62	20.87	14.63	0.70
Reach 1	546	2-year	36.30	151.20	152.87	152.62	153.19	0.006791	2.51	14.49	12.51	0.74
Reach 1	503.8	Regional	113.00	151.25	154.42	153.37	154.47	0.000824	1.28	134.09	234.83	0.26
Reach 1	503.8	100-year	103.00	151.25	154.32	153.27	154.38	0.001020	1.39	112.85	226.23	0.29
Reach 1	503.8	50-year	92.40	151.25	154.22	153.15	154.30	0.001230	1.48	92.70	195.83	0.31
Reach 1	503.8	25-year	79.60	151.25	153.96	153.01	154.13	0.002172	1.89	50.94	121.75	0.42
Reach 1	503.8	10-year	59.60	151.25	153.51	152.77	153.71	0.002343	1.99	29.88	18.73	0.47
Reach 1	503.8	5-year	54.70	151.25	153.39	152.70	153.58	0.002473	1.96	27.92	18.31	0.48
Reach 1	503.8	2-year	36.30	151.25	152.91	152.40	153.07	0.003195	1.80	20.22	16.46	0.51
Reach 1	480		Culvert									
Reach 1	434	Regional	113.00	151.00	153.81	153.09	154.14	0.007139	2.56	45.65	53.37	0.59
Reach 1	434	100-year	103.00	151.00	153.70	152.98	154.01	0.006878	2.49	41.55	27.30	0.58
Reach 1	434	50-year	92.40	151.00	153.62	152.87	153.89	0.006105	2.33	39.68	22.16	0.56
Reach 1	434	25-year	79.60	151.00	153.44	152.73	153.69	0.005568	2.22	35.90	21.24	0.54
Reach 1	434	10-year	59.60	151.00	153.09	152.49	153.33	0.002905	2.15	27.70	19.45	0.53
Reach 1	434	5-year	54.70	151.00	153.02	152.43	153.24	0.002799	2.06	26.61	19.07	0.51
Reach 1	434	2-year	36.30	151.00	152.71	152.15	152.85	0.002497	1.69	21.53	17.49	0.47
Reach 1	133	Regional	134.00	150.37	153.45	153.10	153.60	0.002449	1.95	89.42	132.42	0.40
Reach 1	133	100-year	113.00	150.37	153.36	152.63	153.49	0.002241	1.82	80.95	127.70	0.38
Reach 1	133	50-year	102.00	150.37	153.31	152.48	153.43	0.002104	1.74	76.36	124.90	0.37
Reach 1	133	25-year	88.00	150.37	153.09	152.31	153.26	0.002962	1.93	57.52	106.86	0.43
Reach 1	133	10-year	65.50	150.37	152.85	151.98	153.01	0.003153	1.83	40.11	55.86	0.44
Reach 1	133	5-year	59.70	150.37	152.79	151.90	152.94	0.003002	1.74	37.20	43.19	0.42
Reach 1	133	2-year	40.20	150.37	152.51	151.59	152.61	0.002311	1.43	28.86	25.79	0.37

HEC-RAS Output for Mullet Creek
Proposed Conditions Natural Channel Profile Summary
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Proposed_Conditions_NAT River: Mullet Creek Reach: Reach 1

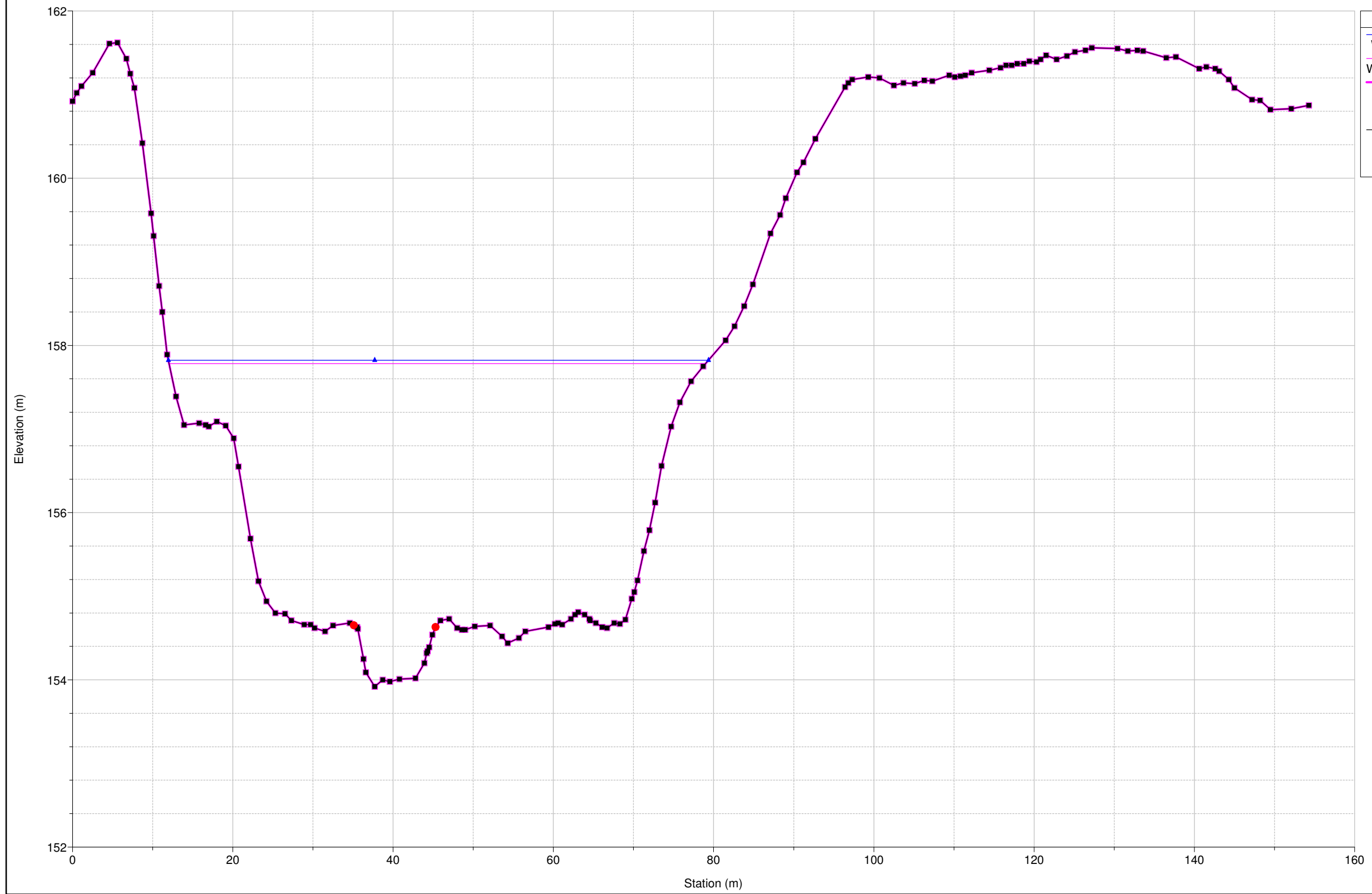
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Volume (1000 m3)
Reach 1	2198	Regional	113.00	153.92	157.36	155.51	157.39	0.001036	1.15	143.81	63.00	0.20	47.99
Reach 1	2198	100-year	103.00	153.92	157.22	155.46	157.26	0.001027	1.11	135.26	62.02	0.20	43.63
Reach 1	2198	50-year	92.40	153.92	157.07	155.41	157.10	0.000991	1.06	125.90	59.70	0.20	40.18
Reach 1	2198	25-year	79.60	153.92	156.87	155.34	156.90	0.000946	0.98	115.01	54.16	0.19	34.48
Reach 1	2198	10-year	59.60	153.92	156.51	155.21	156.53	0.000929	0.89	95.66	52.63	0.18	26.34
Reach 1	2198	5-year	54.70	153.92	156.40	155.18	156.42	0.000949	0.87	89.86	52.24	0.18	24.23
Reach 1	2198	2-year	36.30	153.92	155.96	155.03	155.98	0.001020	0.78	67.23	50.62	0.18	17.55
Reach 1	1557	Regional	113.00	153.57	156.93		157.02	0.019085	1.38	105.35	65.27	0.29	24.95
Reach 1	1557	100-year	103.00	153.57	156.80		156.88	0.019630	1.34	96.83	62.53	0.29	22.14
Reach 1	1557	50-year	92.40	153.57	156.66		156.74	0.019908	1.30	88.38	59.68	0.29	20.33
Reach 1	1557	25-year	79.60	153.57	156.48		156.55	0.020206	1.23	78.14	56.04	0.28	16.57
Reach 1	1557	10-year	59.60	153.57	156.12		156.19	0.022711	1.15	59.47	48.71	0.29	11.92
Reach 1	1557	5-year	54.70	153.57	156.00		156.07	0.024653	1.14	53.80	46.30	0.29	10.87
Reach 1	1557	2-year	36.30	153.57	155.54		155.60	0.033463	1.08	34.49	36.23	0.31	8.06
Reach 1	1501	Regional	113.00	153.50	156.59		156.80	0.001990	2.05	56.10	25.57	0.40	23.48
Reach 1	1501	100-year	103.00	153.50	156.47		156.66	0.001929	1.96	53.16	23.99	0.39	20.79
Reach 1	1501	50-year	92.40	153.50	156.35		156.52	0.001824	1.85	50.43	22.71	0.38	19.09
Reach 1	1501	25-year	79.60	153.50	156.20		156.34	0.001687	1.70	47.01	21.97	0.36	15.45
Reach 1	1501	10-year	59.60	153.50	155.85		155.97	0.001544	1.50	39.67	20.55	0.34	11.05
Reach 1	1501	5-year	54.70	153.50	155.72		155.83	0.001553	1.48	37.01	20.07	0.35	10.07
Reach 1	1501	2-year	36.30	153.50	155.19		155.29	0.001500	1.35	26.91	18.45	0.36	7.53
Reach 1	1270	Regional	113.00	152.75	156.43		156.63	0.002987	2.13	61.97	39.60	0.46	19.67
Reach 1	1270	100-year	103.00	152.75	156.30		156.50	0.003051	2.12	56.88	38.95	0.46	17.21
Reach 1	1270	50-year	92.40	152.75	156.16		156.36	0.003142	2.11	51.21	38.21	0.48	15.75
Reach 1	1270	25-year	79.60	152.75	155.97		156.17	0.003262	2.10	44.12	37.27	0.49	12.42
Reach 1	1270	10-year	59.60	152.75	155.52		155.77	0.003610	2.25	28.61	29.73	0.55	8.69
Reach 1	1270	5-year	54.70	152.75	155.35		155.63	0.003785	2.32	23.89	26.42	0.58	7.93
Reach 1	1270	2-year	36.30	152.75	154.86		155.09	0.004007	2.14	17.00	12.30	0.58	5.98
Reach 1	1165	Regional	113.00	152.67	156.04	155.67	156.45	0.007680	2.99	45.88	30.29	0.65	17.46
Reach 1	1165	100-year	103.00	152.67	155.93	155.56	156.33	0.007444	2.91	42.63	29.75	0.64	15.20
Reach 1	1165	50-year	92.40	152.67	155.81	155.43	156.19	0.007141	2.82	39.09	29.13	0.64	13.95
Reach 1	1165	25-year	79.60	152.67	155.67	155.19	156.01	0.006575	2.66	35.04	28.40	0.62	10.89
Reach 1	1165	10-year	59.60	152.67	155.24	154.77	155.60	0.007441	2.68	23.41	25.49	0.68	7.80
Reach 1	1165	5-year	54.70	152.67	155.07	154.68	155.46	0.006998	2.75	19.87	13.04	0.71	7.23
Reach 1	1165	2-year	36.30	152.67	154.58	154.29	154.92	0.006573	2.59	14.03	10.92	0.73	5.49
Reach 1	976	Regional	113.00	152.04	155.62	155.28	156.04	0.006525	2.99	47.34	40.08	0.65	14.80
Reach 1	976	100-year	103.00	152.04	155.55	154.96	155.94	0.006007	2.86	44.51	39.71	0.62	12.71
Reach 1	976	50-year	92.40	152.04	155.46	154.81	155.82	0.005507	2.72	41.00	39.24	0.60	11.67
Reach 1	976	25-year	79.60	152.04	155.37	154.61	155.68	0.004624	2.47	37.74	38.79	0.56	8.81
Reach 1	976	10-year	59.60	152.04	154.95	154.27	155.25	0.004302	2.39	24.94	14.40	0.58	6.41
Reach 1	976	5-year	54.70	152.04	154.83	154.18	155.11	0.003978	2.36	23.16	13.81	0.58	5.99
Reach 1	976	2-year	36.30	152.04	154.36	153.78	154.59	0.003785	2.11	17.18	11.93	0.56	4.59
Reach 1	944	Regional	113.00	152.06	155.61	154.94	155.97	0.005118	2.78	53.51	45.78	0.59	14.31
Reach 1	944	100-year	103.00	152.06	155.54	154.80	155.87	0.004699	2.65	50.30	45.42	0.57	12.25
Reach 1	944	50-year	92.40	152.06	155.45	154.66	155.75	0.004292	2.52	46.30	44.96	0.55	11.24
Reach 1	944	25-year	79.60	152.06	155.36	154.48	155.62	0.003583	2.29	42.63	44.54	0.50	8.42
Reach 1	944	10-year	59.60	152.06	154.94	154.16	155.19	0.003416	2.22	26.87	14.69	0.52	6.15
Reach 1	944	5-year	54.70	152.06	154.82	154.07	155.06	0.003208	2.18	25.10	14.24	0.52	5.75
Reach 1	944	2-year	36.30	152.06	154.35	153.69	154.54	0.003050	1.93	18.78	12.81	0.51	4.41
Reach 1	914	Regional	113.00	151.96	155.36	155.36	155.89	0.010741	3.35	44.40	50.68	0.78	13.88
Reach 1	914	100-year	103.00	151.96	155.27	155.27	155.79	0.010603	3.30	39.64	50.09	0.78	11.86
Reach 1	914	50-year	92.40	151.96	155.27	154.88	155.69	0.008524	2.96	39.66	50.09	0.70	10.87
Reach 1	914	25-year	79.60	151.96	155.25	154.69	155.57	0.006552	2.59	38.70	49.97	0.61	8.06
Reach 1	914	10-year	59.60	151.96	154.75	154.36	155.14	0.006800	2.76	21.58	13.95	0.71	5.94
Reach 1	914	5-year	54.70	151.96	154.62	154.27	155.01	0.006691	2.76	19.81	13.38	0.72	5.55
Reach 1	914	2-year	36.30	151.96	154.14	153.88	154.49	0.006982	2.61	13.93	11.27	0.75	4.27
Reach 1	746.7	Regional	113.00	151.75	155.16	154.94	155.39	0.004909	2.44	60.44	55.07	0.53	11.37
Reach 1	746.7	100-year	103.00	151.75	155.08	154.88	155.31	0.004842	2.40	56.23	54.58	0.53	9.55
Reach 1	746.7	50-year	92.40	151.75	155.16	154.81	155.32	0.003264	1.99	60.57	55.09	0.43	8.46
Reach 1	746.7	25-year	79.60	151.75	154.36	154.28	155.11	0.010936	3.84	21.01	32.26	0.94	6.58
Reach 1	746.7	10-year	59.60	151.75	153.92	153.92	154.66	0.012311	3.79	15.71	10.66	1.00	4.98
Reach 1	746.7	5-year	54.70	151.75	153.83	153.83	154.53	0.012455	3.73	14.68	10.34	1.00	4.67
Reach 1	746.7	2-year	36.30	151.75	153.41	153.41	154.00	0.013135	3.41	10.64	8.96	1.00	3.64
Reach 1	684.9	Regional	113.00	151.49	154.85	154.85	155.27	0.007601	3.14	47.19	51.42	0.67	10.50
Reach 1	684.9	100-year	103.00	151.49	154.77	154.77	155.19	0.007375	3.07	43.52	50.98	0.66	8.73
Reach 1	684.9	50-year	92.40	151.49	154.22	154.22	155.15	0.014187	4.26	21.71	11.73	1.00	7.77
Reach 1	684.9	25-year	79.60	151.49	154.01	154.01	154.88	0.013423	4.13	19.29	11.16	1.00	6.20
Reach 1	684.9	10-year	59.60	151.49	153.61	153.65	154.41	0.013410	3.97	15.00	10.06	1.04	4.70
Reach 1	684.9	5-year	54.70	151.49	153.51	153.55	154.28	0.013624	3.91	14.01	9.78	1.04	4.40
Reach 1	684.9	2-year	36.30	151.49	153.09	153.13	153.74	0.014322	3.56	10.21	8.62	1.04	3.44
Reach 1	642	Regional	113.00	151.50	154.33	154.57	155.09	0.013510	3.98	34.05	50.05	0.94	9.86
Reach 1	642	100-year	103.00	151.50	154.22	154.50	155.01	0.013772	3.98	28.99	43.06	0.96	8.18

HEC-RAS Output for Mullet Creek
Proposed Conditions Natural Channel Profile Summary
66 Thomas Street - HEC RAS Design (1419-4679)
January 28, 2022
Modeled by: JA

HEC-RAS Plan: CFCA_Proposed_Conditions_NAT River: Mullet Creek Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Volume (1000 m3)
Reach 1	642	50-year	92.40	151.50	153.80	154.03	154.93	0.016799	4.70	19.66	12.47	1.20	7.51
Reach 1	642	25-year	79.60	151.50	153.64	153.84	154.67	0.016613	4.50	17.70	11.92	1.18	5.96
Reach 1	642	10-year	59.60	151.50	153.36	153.50	154.22	0.015968	4.10	14.54	10.97	1.14	4.51
Reach 1	642	5-year	54.70	151.50	153.30	153.41	154.10	0.015456	3.96	13.82	10.75	1.11	4.22
Reach 1	642	2-year	36.30	151.50	153.02	153.02	153.58	0.012853	3.31	10.98	9.80	1.00	3.31
Reach 1	546	Regional	113.00	151.20	153.70	153.79	154.63	0.016688	4.25	26.57	16.34	1.06	8.95
Reach 1	546	100-year	103.00	151.20	153.48	153.67	154.50	0.019082	4.48	22.98	15.29	1.17	7.40
Reach 1	546	50-year	92.40	151.20	153.28	153.53	154.36	0.020460	4.60	20.10	14.39	1.24	6.92
Reach 1	546	25-year	79.60	151.20	153.14	153.36	154.13	0.019155	4.42	18.03	13.72	1.23	5.43
Reach 1	546	10-year	59.60	151.20	152.88	153.05	153.72	0.017560	4.05	14.71	12.59	1.20	4.07
Reach 1	546	5-year	54.70	151.20	152.81	152.97	153.61	0.017554	3.96	13.82	12.27	1.19	3.82
Reach 1	546	2-year	36.30	151.20	152.72	152.62	153.14	0.009712	2.85	12.73	11.86	0.88	2.96
Reach 1	503.8	Regional	113.00	151.25	154.18	153.40	154.29	0.002971	1.71	88.37	188.82	0.39	8.26
Reach 1	503.8	100-year	103.00	151.25	153.80	153.30	154.19	0.006764	2.78	39.26	55.25	0.65	7.01
Reach 1	503.8	50-year	92.40	151.25	153.70	153.18	154.07	0.006293	2.68	34.88	31.00	0.64	6.57
Reach 1	503.8	25-year	79.60	151.25	153.52	153.03	153.86	0.005864	2.57	30.98	18.78	0.64	5.12
Reach 1	503.8	10-year	59.60	151.25	153.24	152.77	153.51	0.004893	2.30	25.88	17.75	0.61	3.81
Reach 1	503.8	5-year	54.70	151.25	153.16	152.70	153.41	0.004770	2.24	24.39	17.42	0.61	3.57
Reach 1	503.8	2-year	36.30	151.25	152.78		152.98	0.004391	2.01	18.05	15.67	0.60	2.76
Reach 1	434	Regional	113.00	151.00	153.81	153.13	154.14	0.007139	2.56	45.65	53.37	0.59	6.87
Reach 1	434	100-year	103.00	151.00	153.70		154.01	0.006875	2.48	41.56	27.34	0.58	6.15
Reach 1	434	50-year	92.40	151.00	153.62		153.89	0.006102	2.33	39.68	22.16	0.56	5.78
Reach 1	434	25-year	79.60	151.00	153.44		153.69	0.005570	2.22	35.89	21.24	0.54	4.41
Reach 1	434	10-year	59.60	151.00	153.18		153.38	0.004391	1.95	30.50	19.97	0.50	3.22
Reach 1	434	5-year	54.70	151.00	153.10		153.28	0.004083	1.89	28.90	19.50	0.50	3.01
Reach 1	434	2-year	36.30	151.00	152.73		152.87	0.002918	1.64	22.13	17.60	0.47	2.33
Reach 1	133	Regional	134.00	150.37	153.45	153.10	153.60	0.002449	1.95	89.42	132.42	0.40	
Reach 1	133	100-year	113.00	150.37	153.36	152.63	153.49	0.002241	1.82	80.95	127.70	0.38	
Reach 1	133	50-year	102.00	150.37	153.31	152.48	153.43	0.002104	1.74	76.36	124.90	0.37	
Reach 1	133	25-year	88.00	150.37	153.09	152.31	153.26	0.002962	1.93	57.52	106.86	0.43	
Reach 1	133	10-year	65.50	150.37	152.85	151.98	153.01	0.003153	1.83	40.11	55.86	0.44	
Reach 1	133	5-year	59.70	150.37	152.79	151.90	152.94	0.003002	1.74	37.20	43.19	0.42	
Reach 1	133	2-year	40.20	150.37	152.51	151.59	152.61	0.002311	1.43	28.86	25.79	0.37	

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
Geom: CFCA_Existing_Conditions
River = Mullet Creek Reach = Reach 1 RS = 2198 Cross-Section added by Crozier is extracted from the Southwester



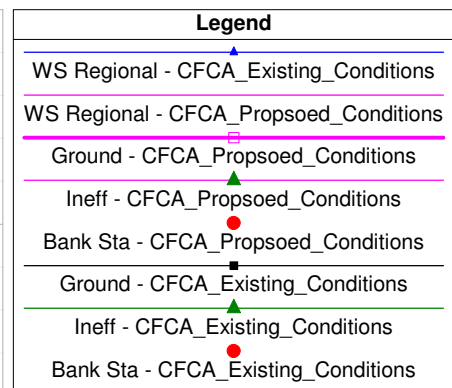
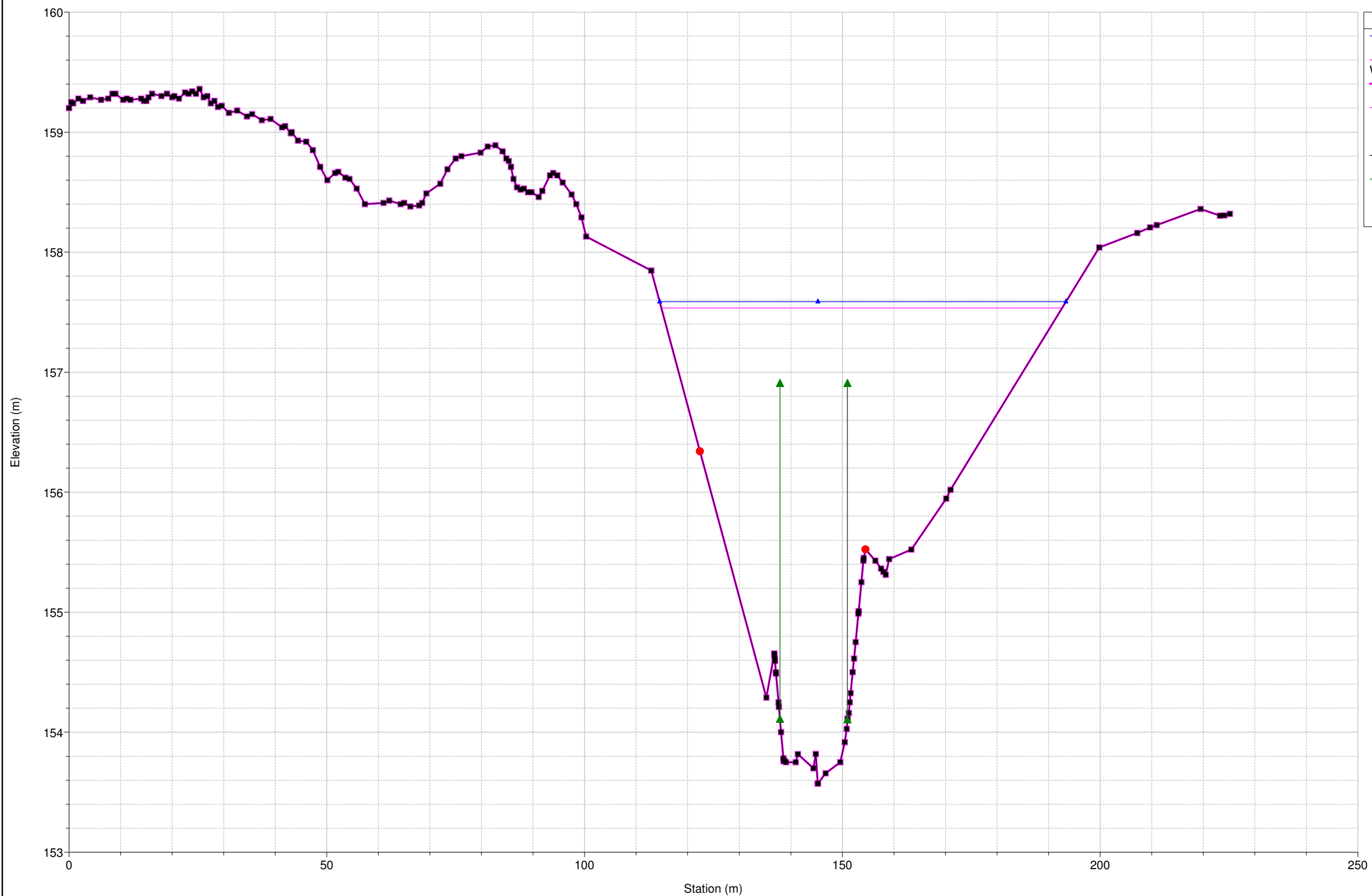
Legend

- WS Regional - CFCA_Existing_Conditions (Blue line with triangle)
- WS Regional - CFCA_Propsoed_Conditions (Magenta line with square)
- Ground - CFCA_Propsoed_Conditions (Red dot)
- Bank Sta - CFCA_Propsoed_Conditions (Black square)
- Ground - CFCA_Existing_Conditions (Black square)
- Bank Sta - CFCA_Existing_Conditions (Red dot)

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

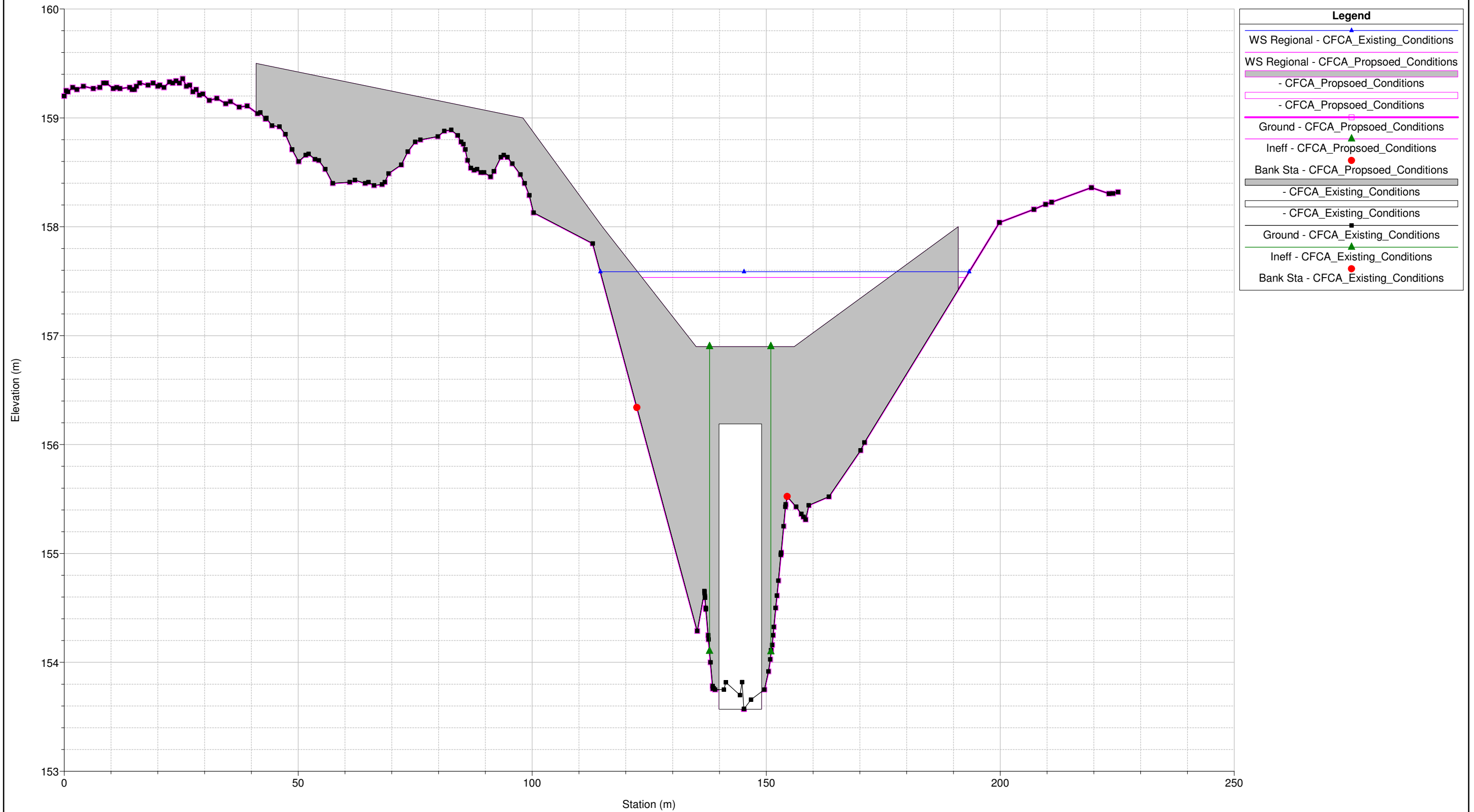
River = Mullet Creek Reach = Reach 1 RS = 1557 Cross-Section added by Crozier is extracted from topographic sur



Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 1540 Culv Check invert of cross-sections so they match up with existing m



Legend	
WS Regional - CFCA_Existing_Conditions	▲
WS Regional - CFCA_Propsoed_Conditions	▲
- CFCA_Propsoed_Conditions	—
- CFCA_Propsoed_Conditions	—
Ground - CFCA_Propsoed_Conditions	—
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	—
- CFCA_Existing_Conditions	—
Ground - CFCA_Existing_Conditions	—
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 1540 Culv Check invert of cross-sections so they match up with existing m

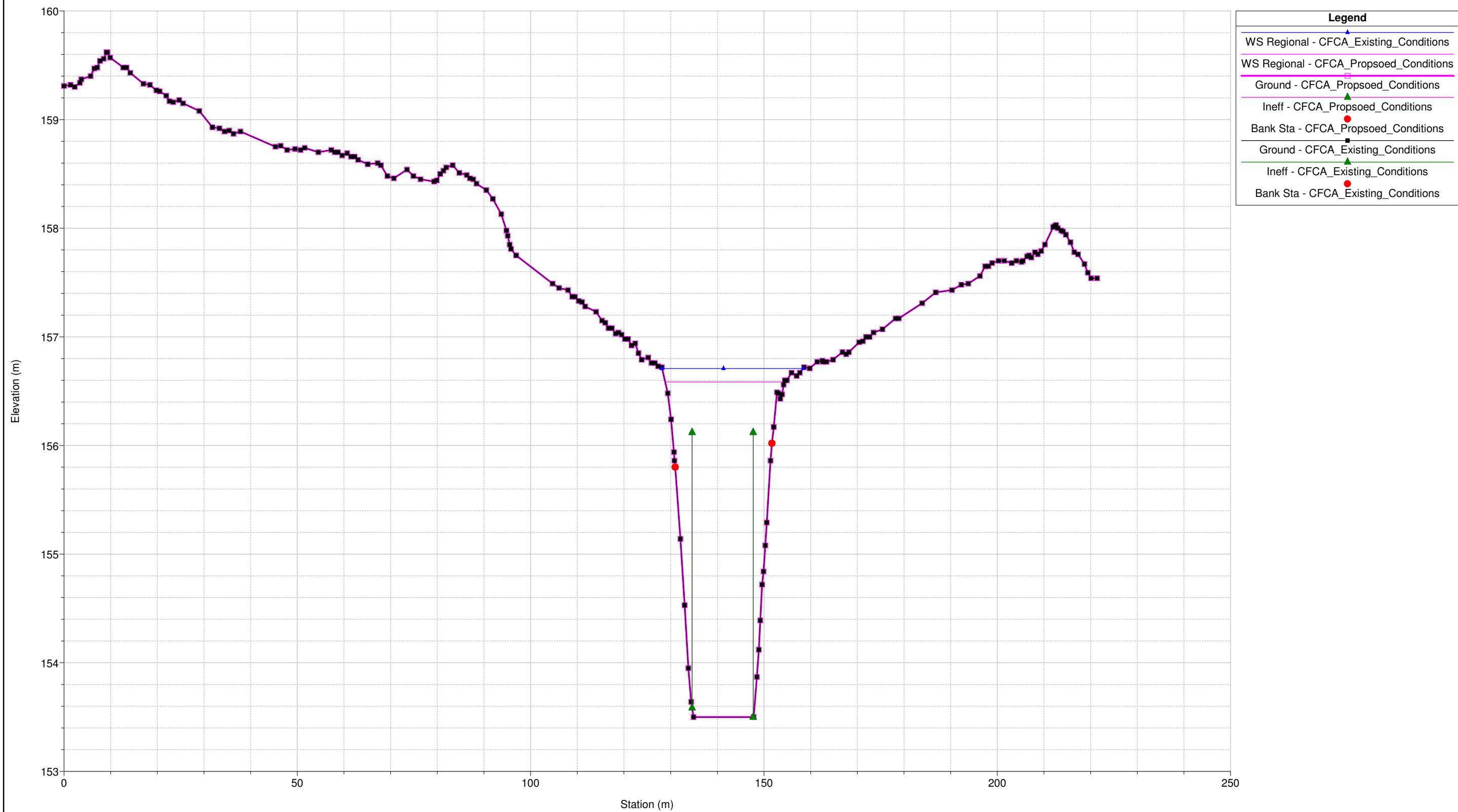


Legend	
WS Regional - CFCA_Existing_Conditions	▲
WS Regional - CFCA_Propsoed_Conditions	▲
- CFCA_Propsoed_Conditions	■
- CFCA_Existing_Conditions	■
Ground - CFCA_Propsoed_Conditions	▲
Ground - CFCA_Existing_Conditions	▲
Ineff - CFCA_Propsoed_Conditions	●
Ineff - CFCA_Existing_Conditions	●
Bank Sta - CFCA_Propsoed_Conditions	●
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

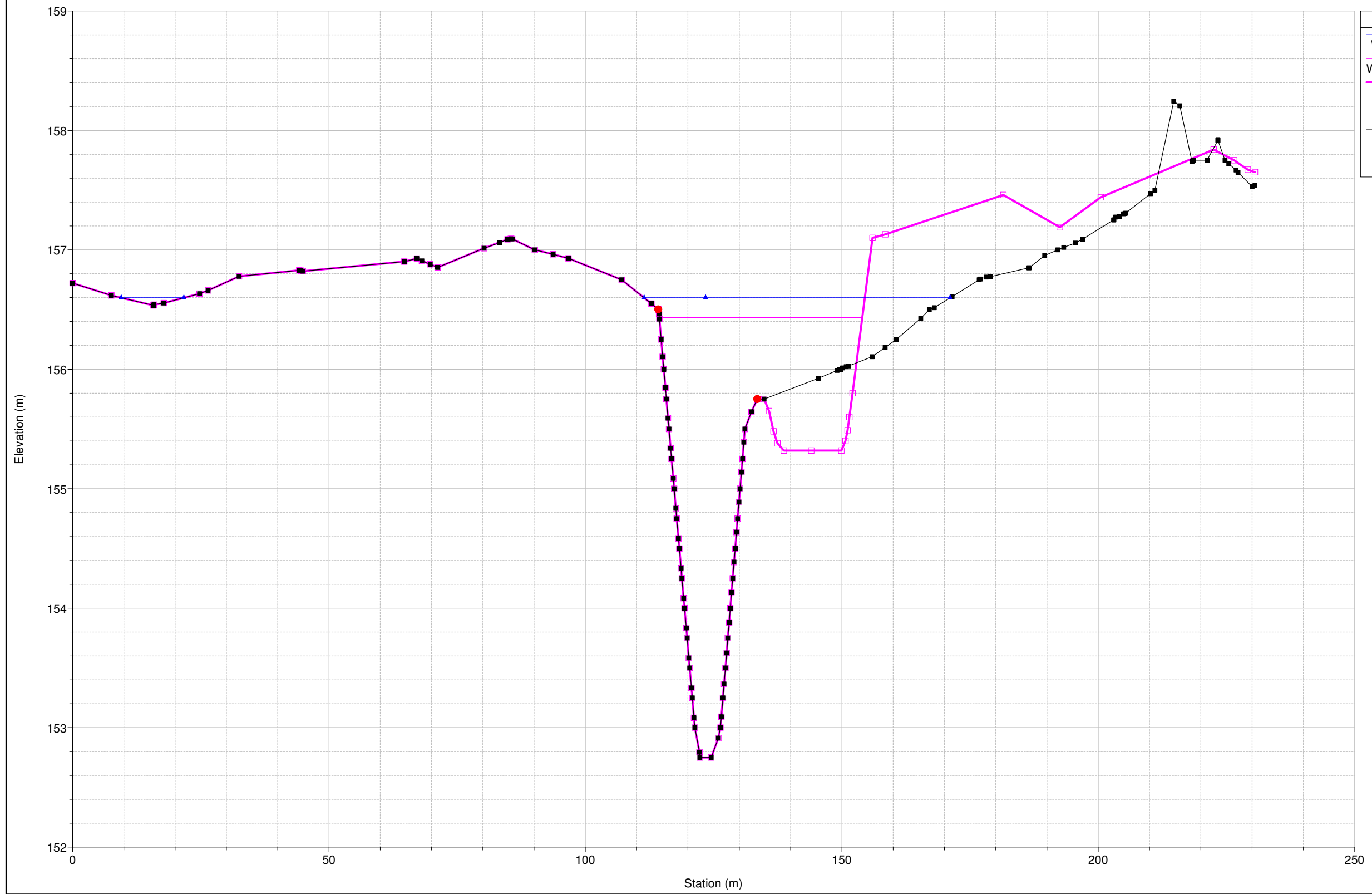
River = Mullet Creek Reach = Reach 1 RS = 1501 Cross-Section added by Crozier is extracted from topographic sur



Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 1270 Cross-Section added by Crozier is extracted from topographic sur



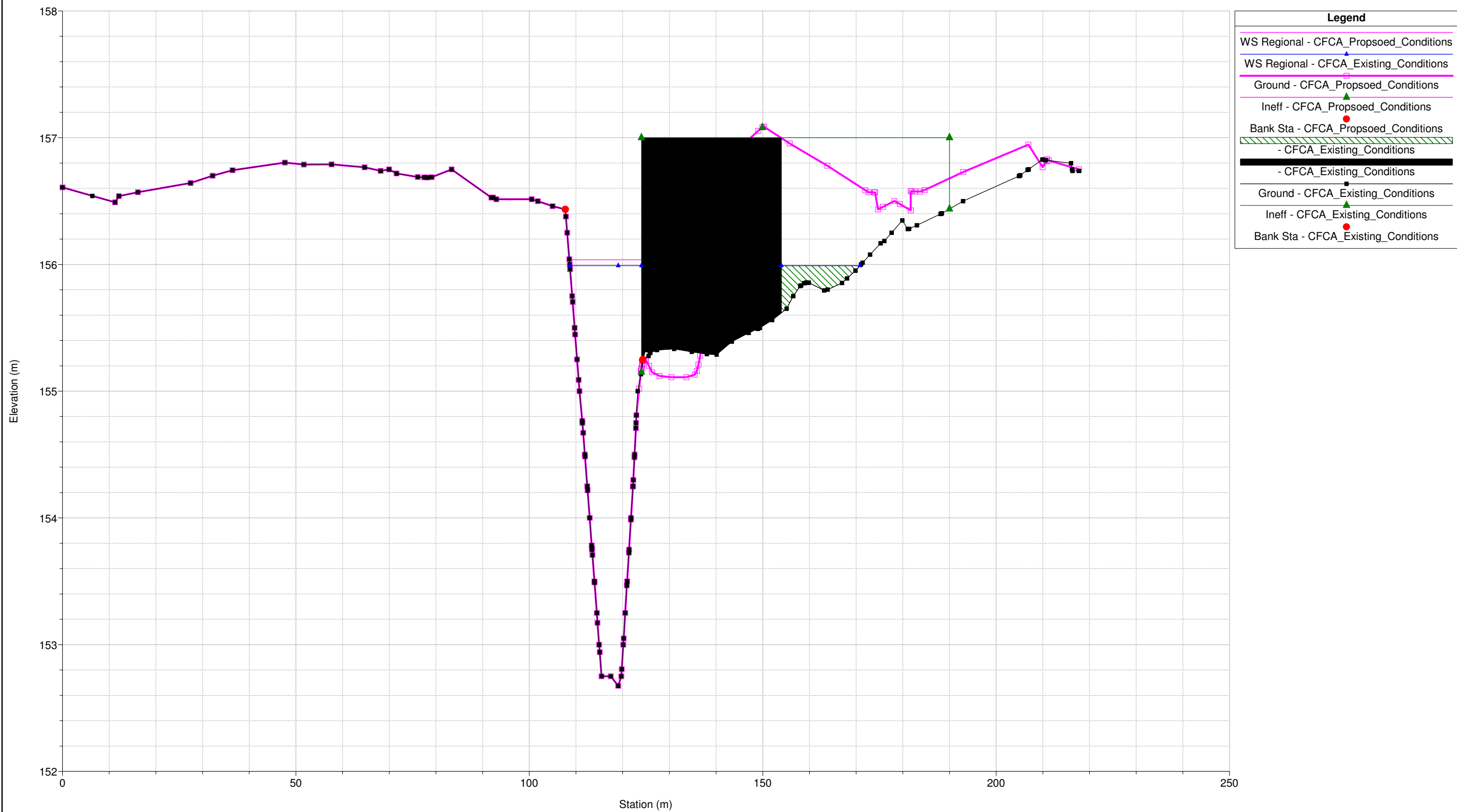
Legend

- WS Regional - CFCA_Existing_Conditions (Blue line with triangle marker)
- WS Regional - CFCA_Propsoed_Conditions (Magenta line with square marker)
- Ground - CFCA_Propsoed_Conditions (Black line with square marker)
- Bank Sta - CFCA_Propsoed_Conditions (Red dot)
- Ground - CFCA_Existing_Conditions (Black line with square marker)
- Bank Sta - CFCA_Existing_Conditions (Red dot)

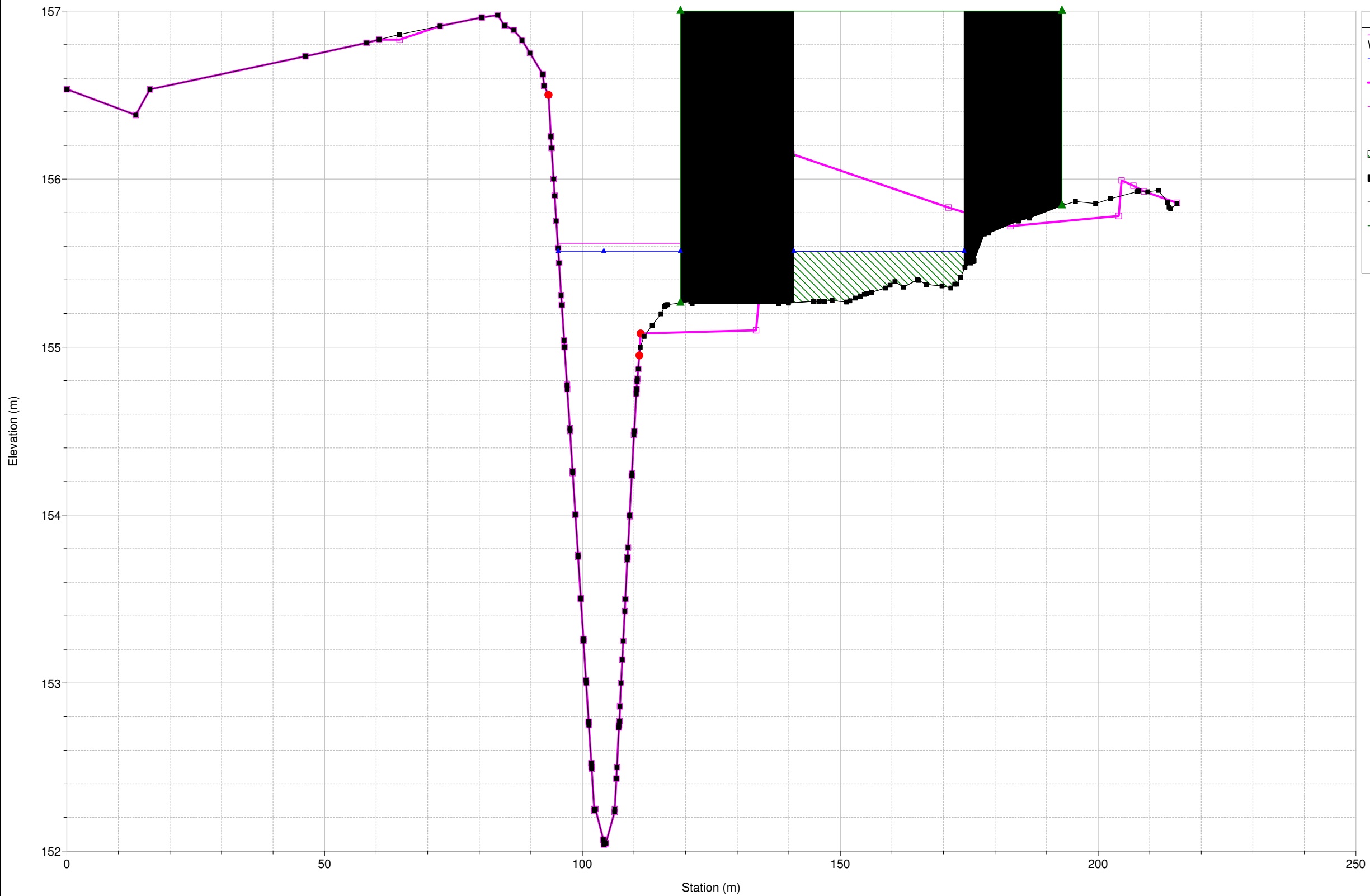
Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 1165 Cross-Section added by Crozier is extracted from topographic sur

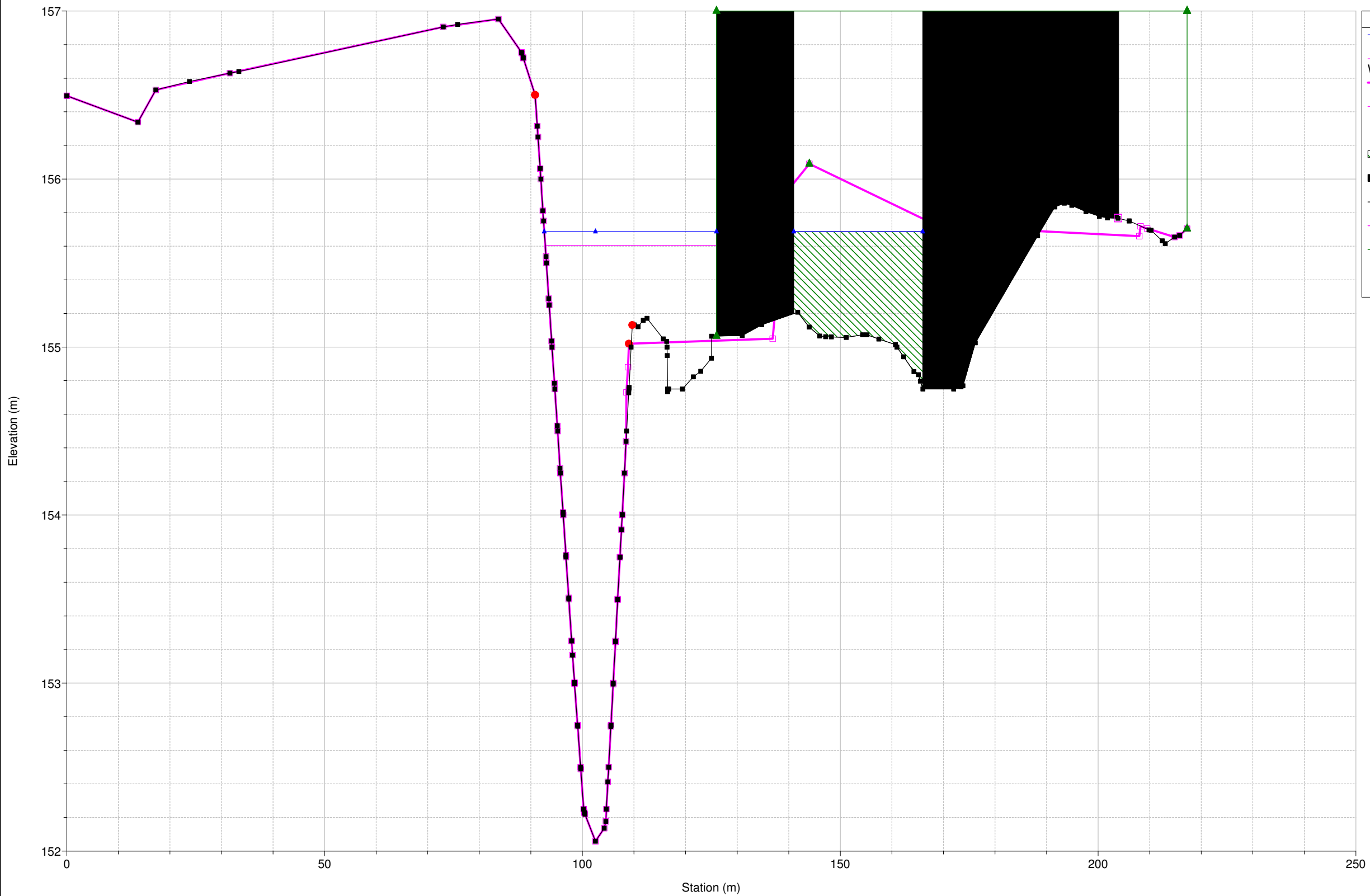


Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 Geom: CFCA_Existing_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 976 Cross-Section added by Crozier is extracted from topographic sur



Legend	
WS Regional - CFCA_Propsoed_Conditions	▲
WS Regional - CFCA_Existing_Conditions	▲
Ground - CFCA_Propsoed_Conditions	■
Ineff - CFCA_Propsoed_Conditions	●
Bank Sta - CFCA_Propsoed_Conditions	●
Ground - CFCA_Existing_Conditions	■
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 Geom: CFCA_Existing_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 944 Cross-Section added by Crozier is extracted from topographic sur



Legend	
WS Regional - CFCA_Existing_Conditions	▲
WS Regional - CFCA_Propsoed_Conditions	■
Ground - CFCA_Propsoed_Conditions	▲
Ineff - CFCA_Propsoed_Conditions	●
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	▨
- CFCA_Existing_Conditions	■
Ground - CFCA_Existing_Conditions	■
Levee - CFCA_Existing_Conditions	▨
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

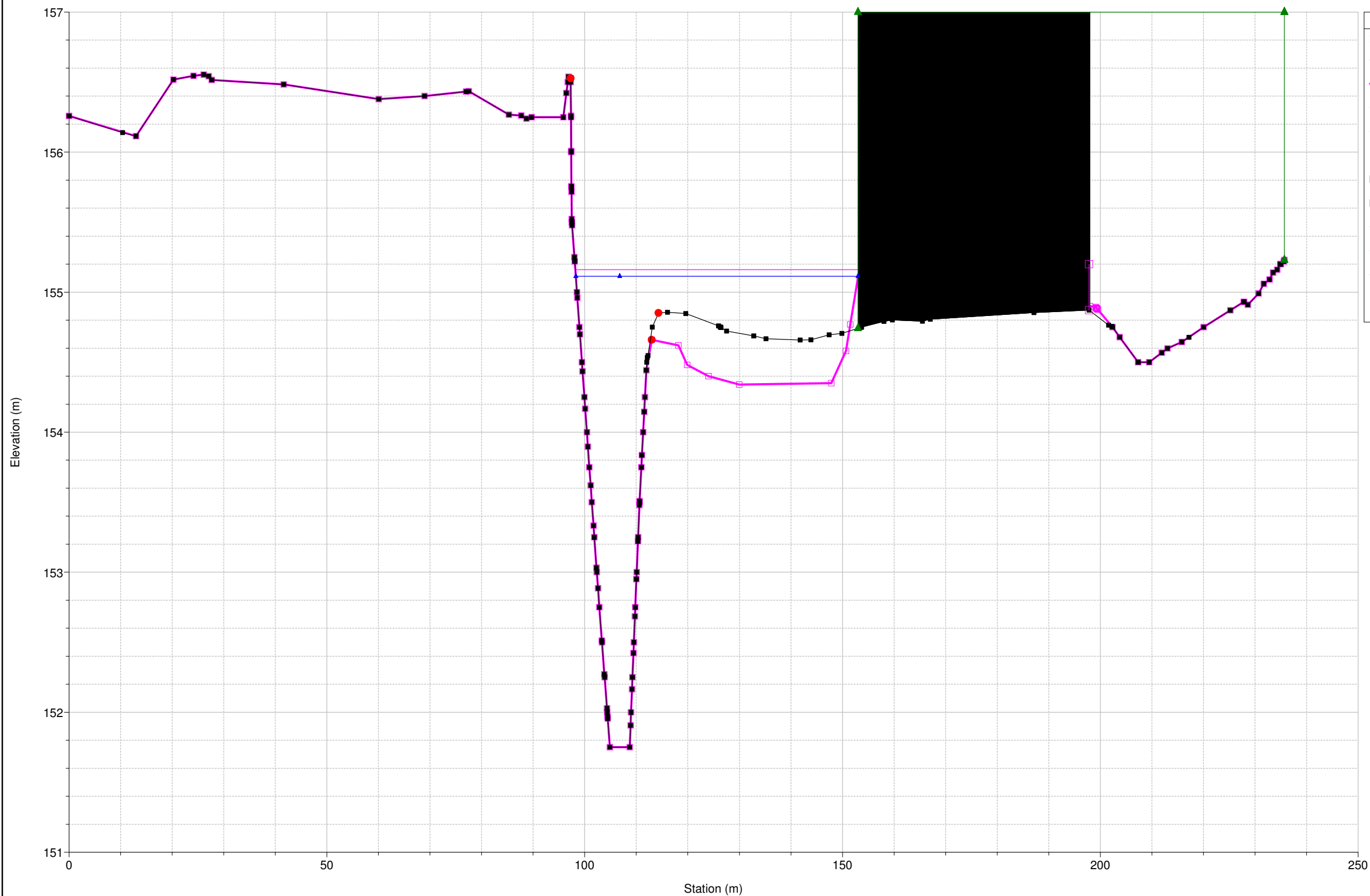
Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 914 Cross-Section added by Crozier is extracted from topographic sur



Legend	
WS Regional - CFCA_Existing_Conditions	▲
WS Regional - CFCA_Propsoed_Conditions	▲
Ground - CFCA_Propsoed_Conditions	■
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	▨
- CFCA_Existing_Conditions	■
Ground - CFCA_Existing_Conditions	■
Levee - CFCA_Existing_Conditions	■
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 746.7 Cross-Section added by Crozier is extracted from topographic sur

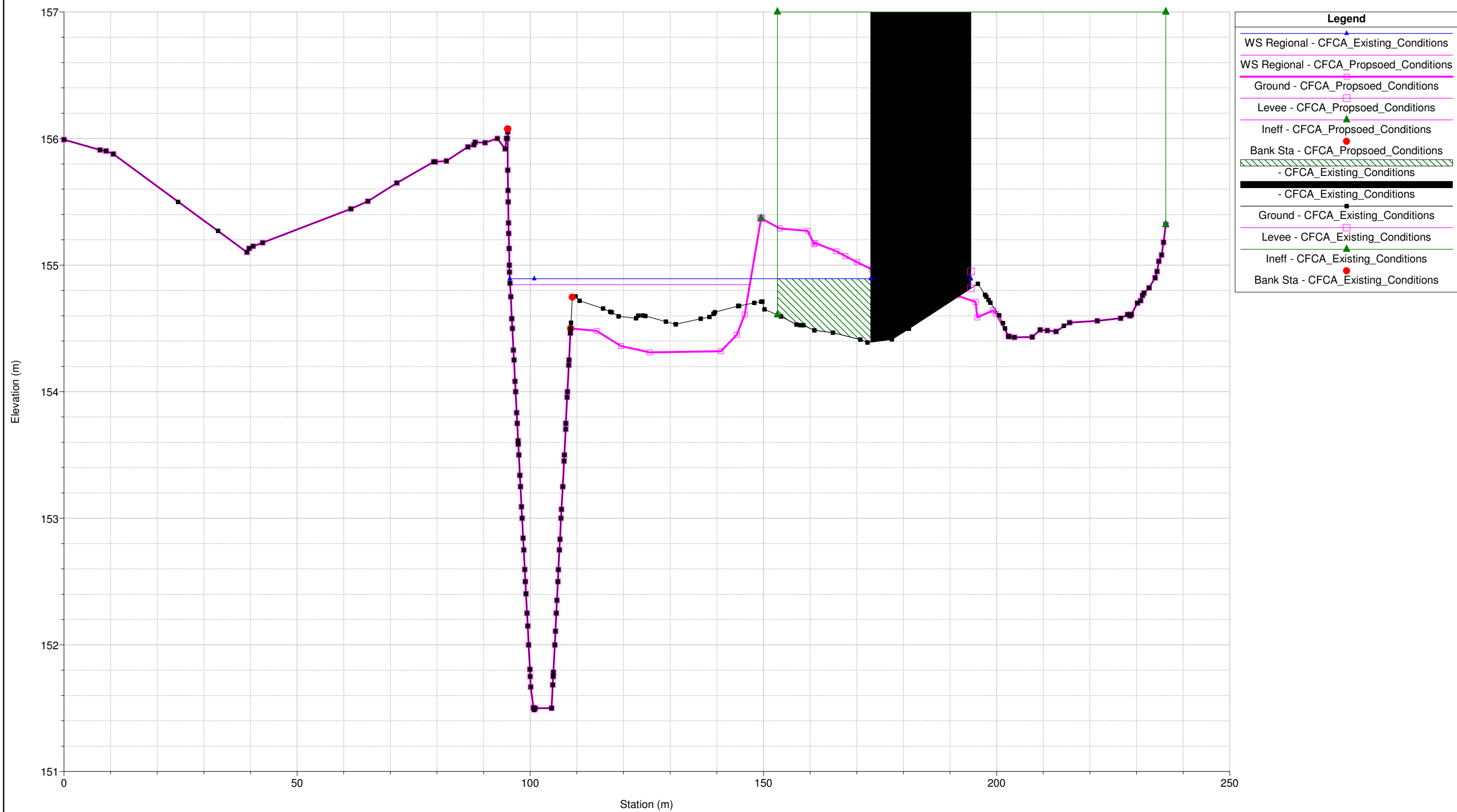


Legend	
WS Regional - CFCA_Propsoed_Conditions	▲
WS Regional - CFCA_Existing_Conditions	▲
Ground - CFCA_Propsoed_Conditions	■
Levee - CFCA_Propsoed_Conditions	■
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	▨
- CFCA_Existing_Conditions	■
Ground - CFCA_Existing_Conditions	■
Levee - CFCA_Existing_Conditions	■
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

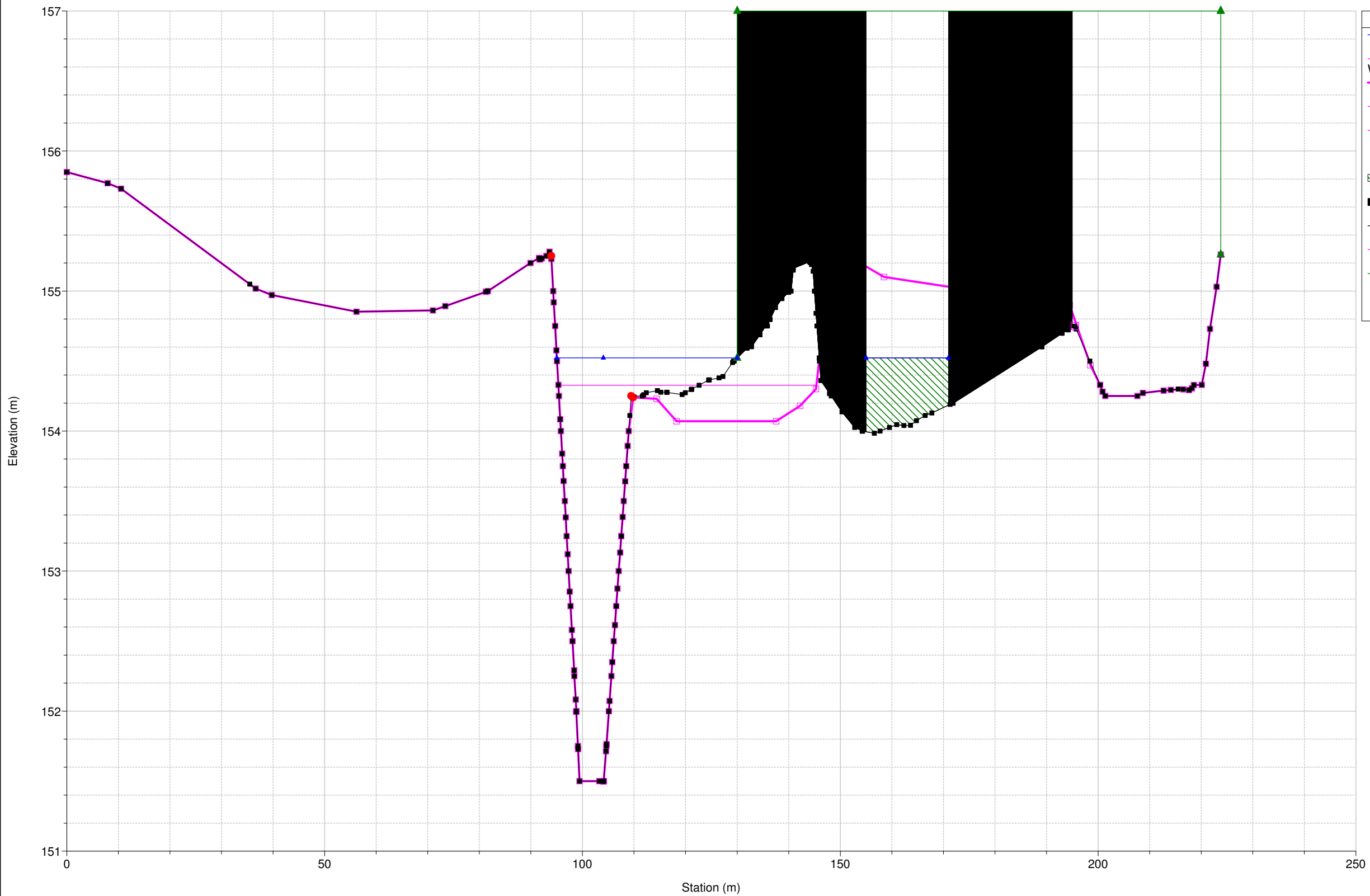
Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 684.9 Cross-Section added by Crozier is extracted from topographic sur

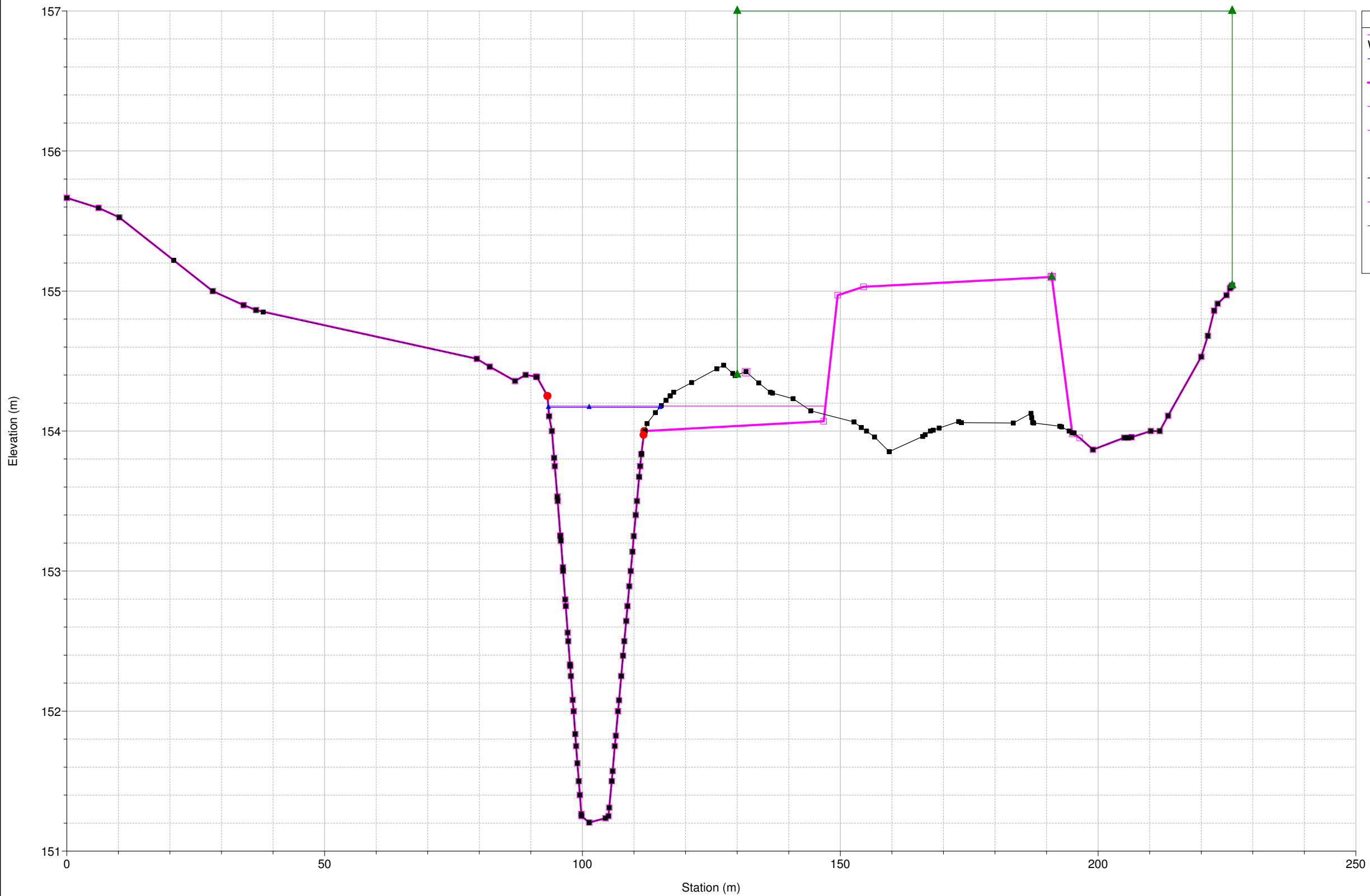


Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 642 Cross-Section added by Crozier is extracted from topographic sur



Legend	
WS Regional - CFCA_Existing_Conditions	▲
WS Regional - CFCA_Propsoed_Conditions	▲
Ground - CFCA_Propsoed_Conditions	■
Levee - CFCA_Propsoed_Conditions	■
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	■
Ground - CFCA_Existing_Conditions	■
Levee - CFCA_Existing_Conditions	■
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 Geom: CFCA_Existing_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 546 Cross-Section added by Crozier is extracted from topographic sur

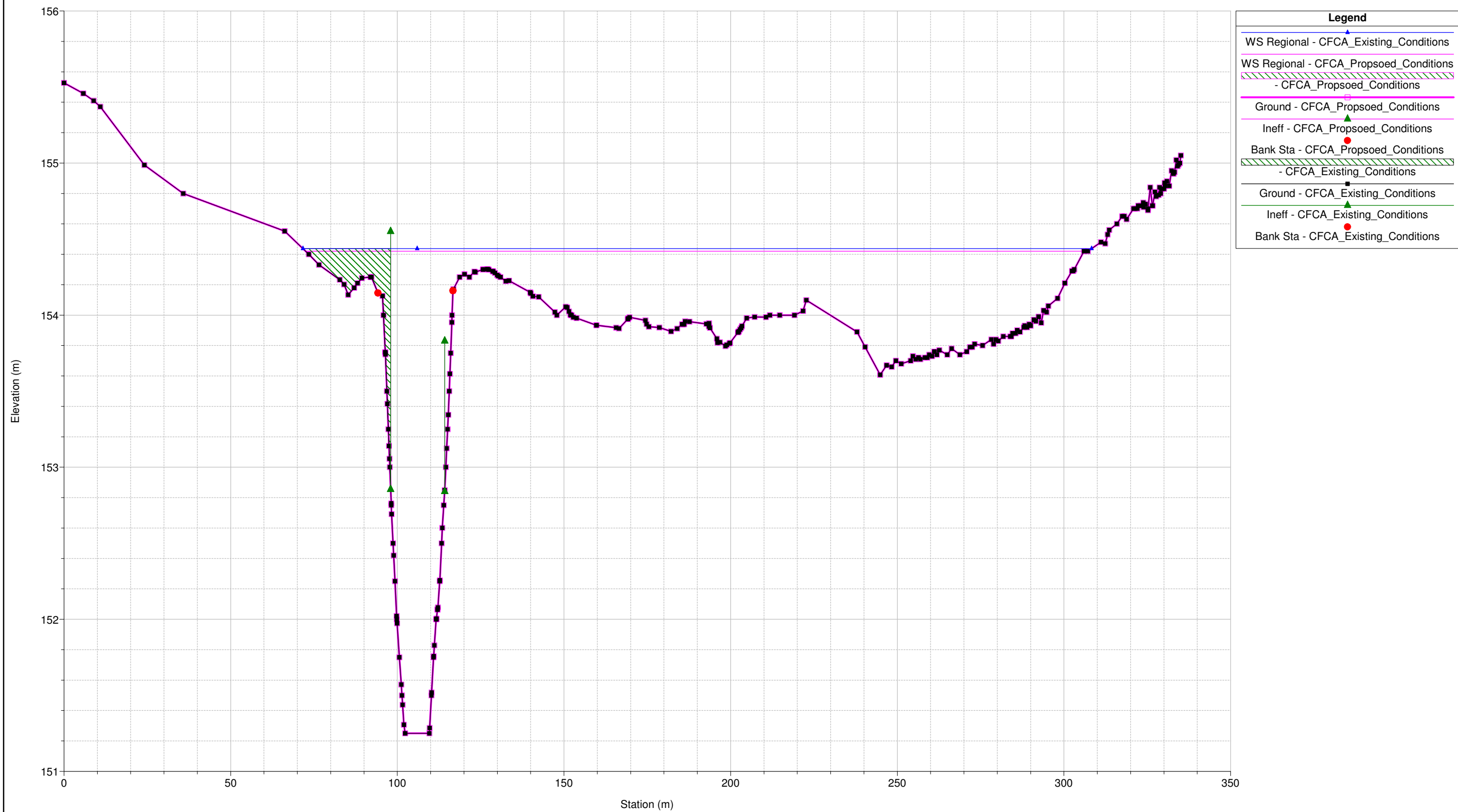


Legend	
WS Regional - CFCA_Propsoed_Conditions	▲
WS Regional - CFCA_Existing_Conditions	▲
Ground - CFCA_Propsoed_Conditions	□
Levee - CFCA_Propsoed_Conditions	□
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
Ground - CFCA_Existing_Conditions	■
Levee - CFCA_Existing_Conditions	□
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●

Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

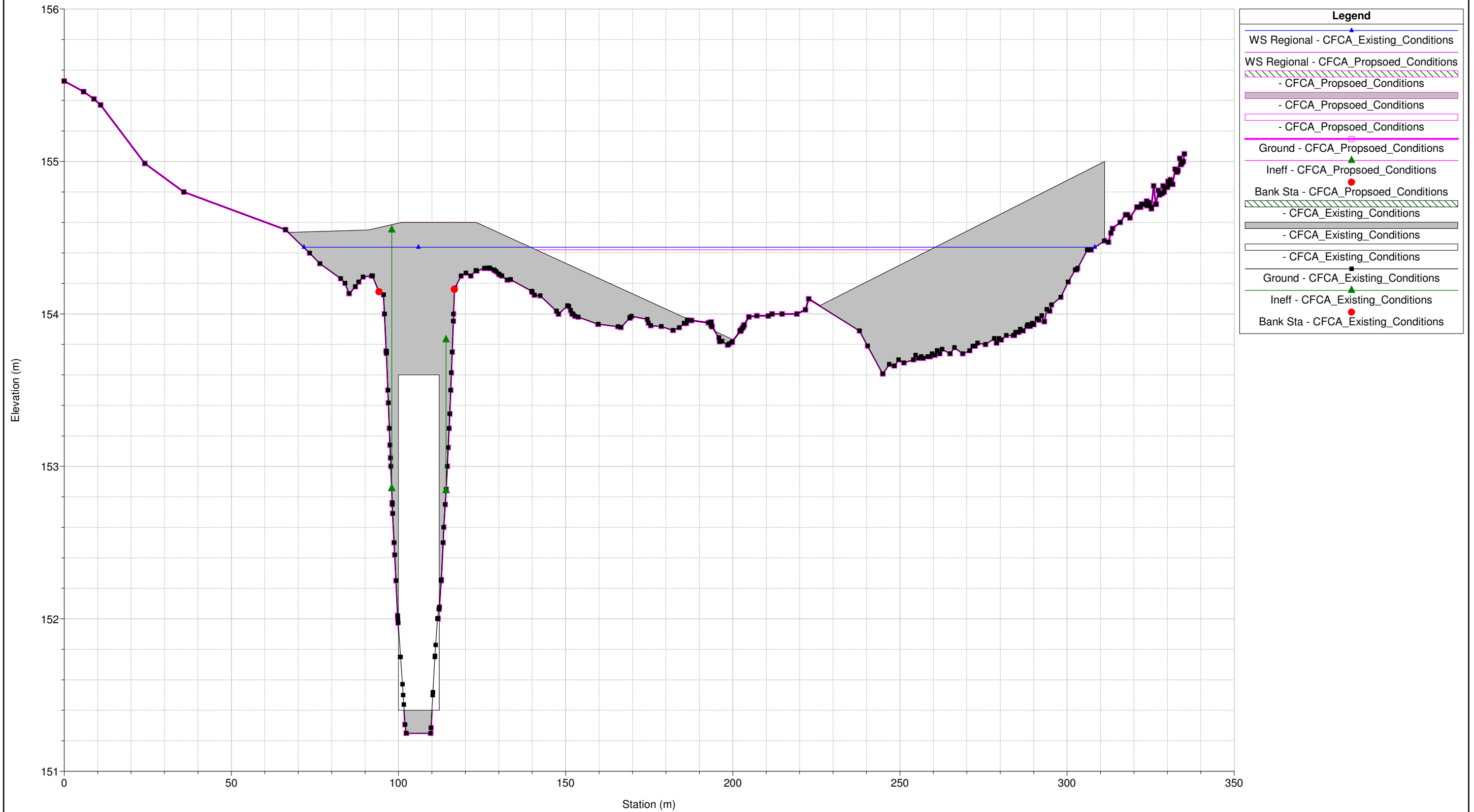
River = Mullet Creek Reach = Reach 1 RS = 503.8 Cross-Section added by Crozier is extracted from topographic sur



Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

Geom: CFCA_Existing_Conditions

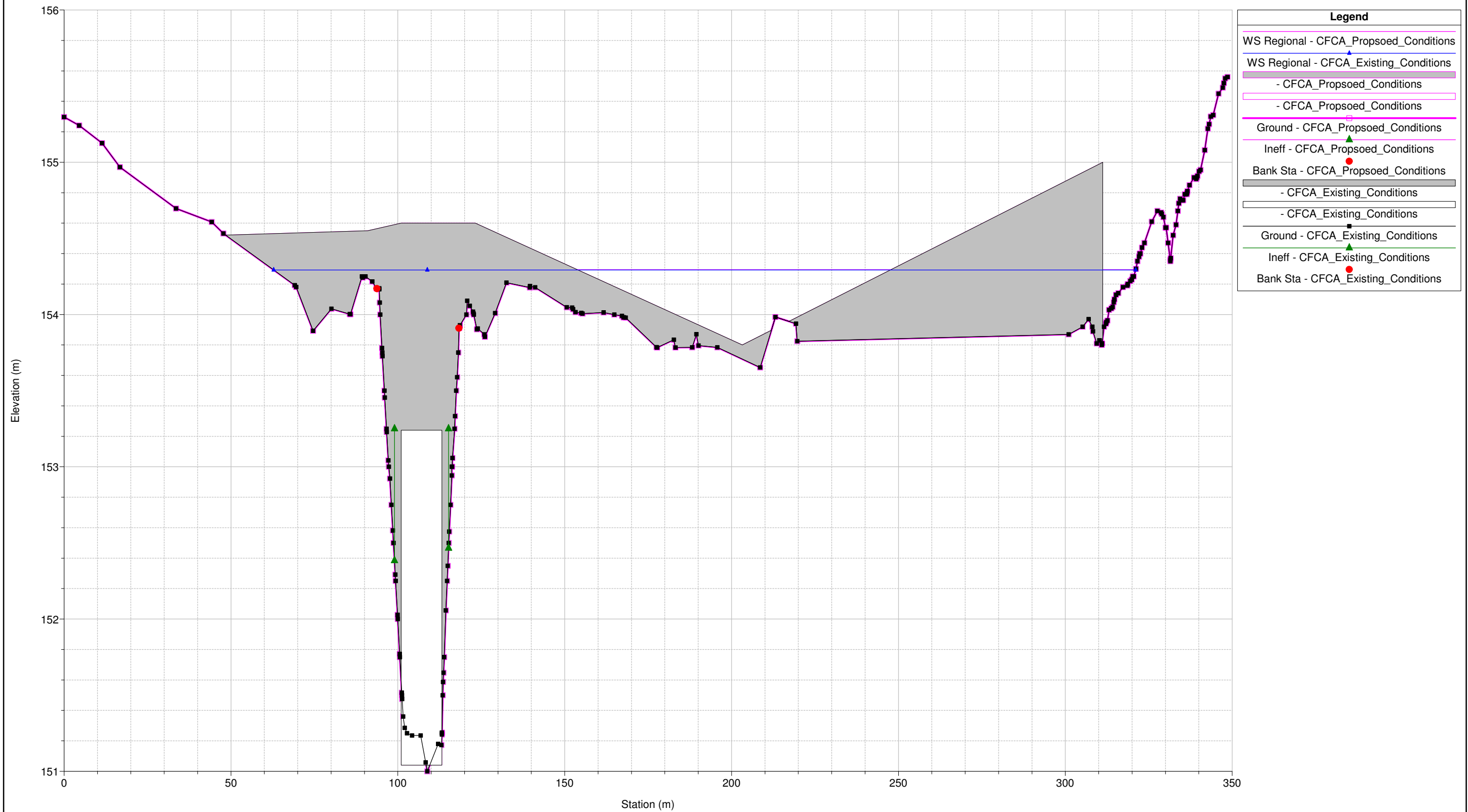
River = Mullet Creek Reach = Reach 1 RS = 480 Culv Check inverts of cross-sections so they match up with existing m



Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions

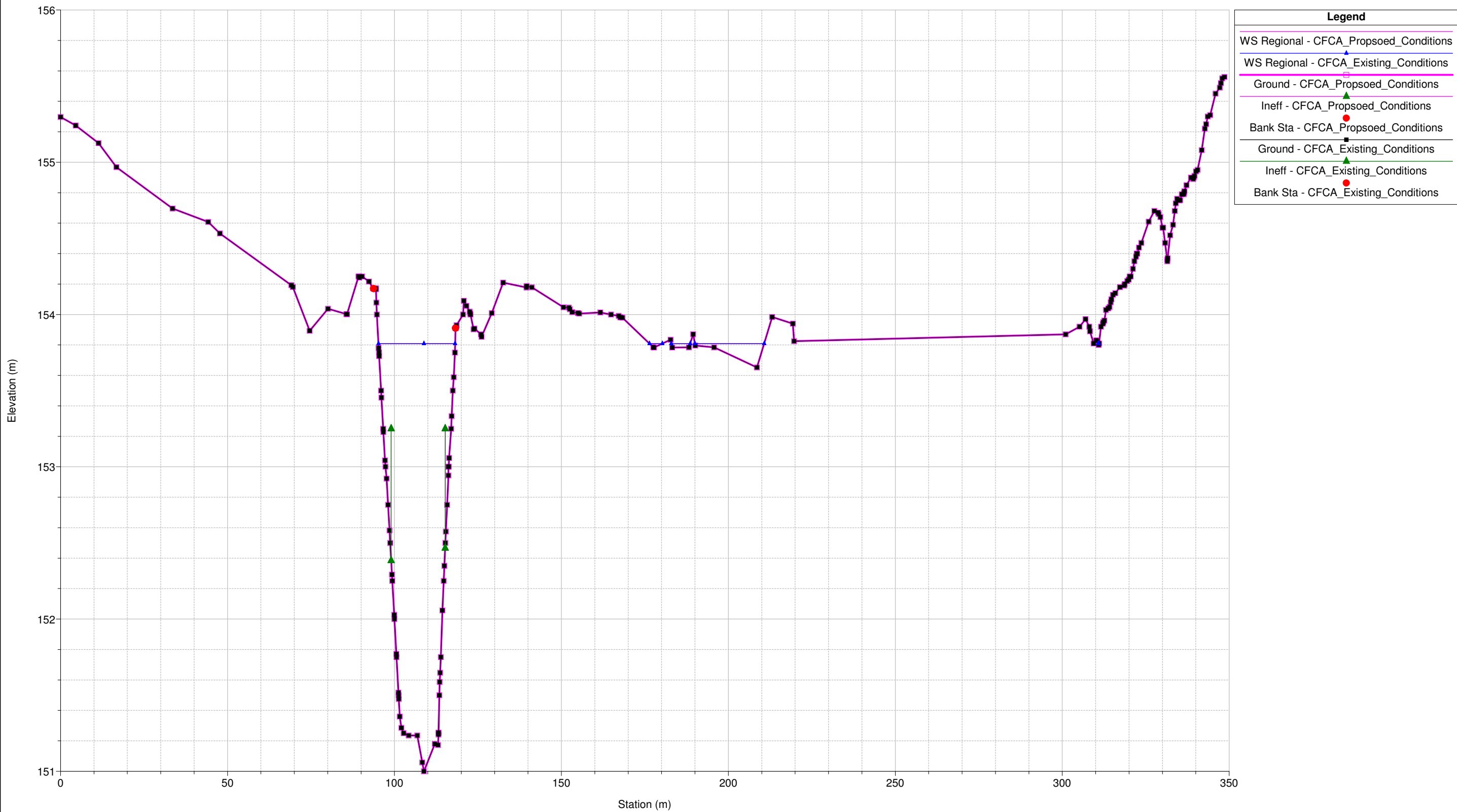
Geom: CFCA_Existing_Conditions

River = Mullet Creek Reach = Reach 1 RS = 480 Culv Check invert of cross-sections so they match up with existing m

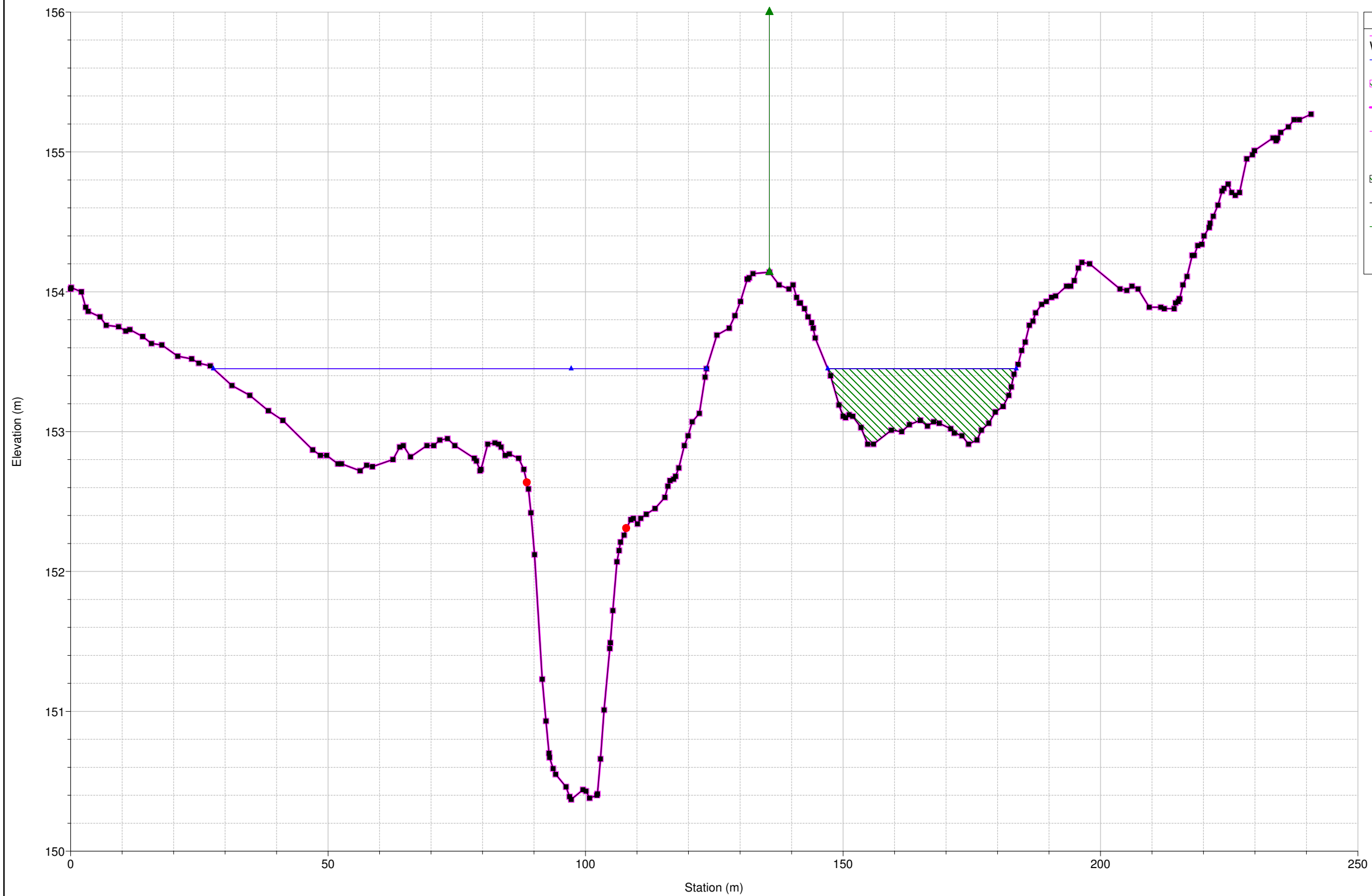


Legend	
WS Regional - CFCA_Propsoed_Conditions	▲
WS Regional - CFCA_Existing_Conditions	▲
- CFCA_Propsoed_Conditions	■
- CFCA_Existing_Conditions	■
Ground - CFCA_Propsoed_Conditions	□
Ground - CFCA_Existing_Conditions	□
Ineff - CFCA_Propsoed_Conditions	▲
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
Bank Sta - CFCA_Existing_Conditions	●

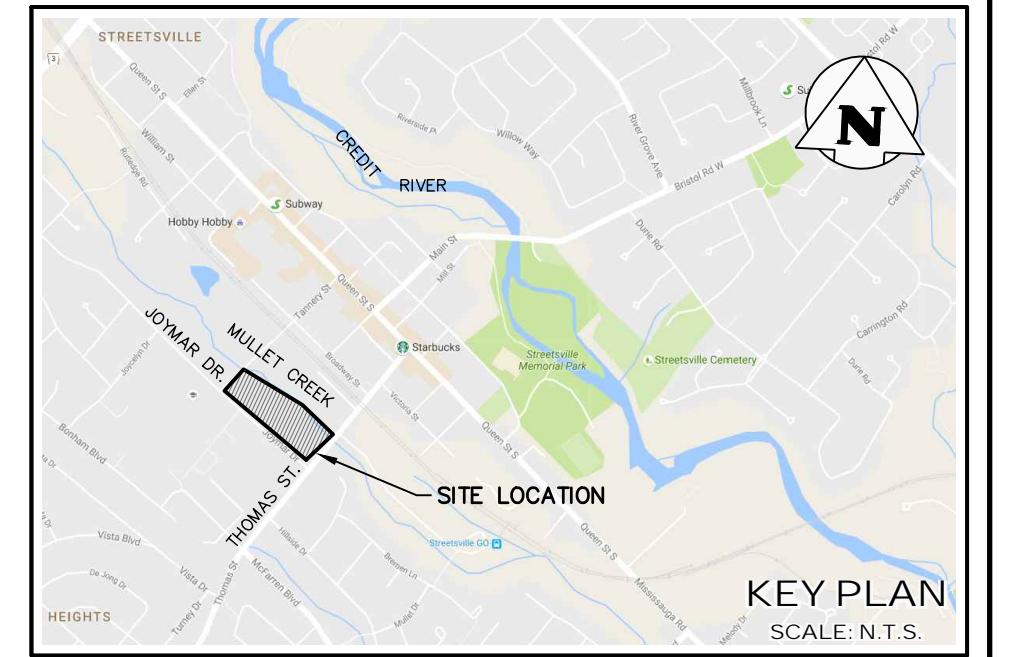
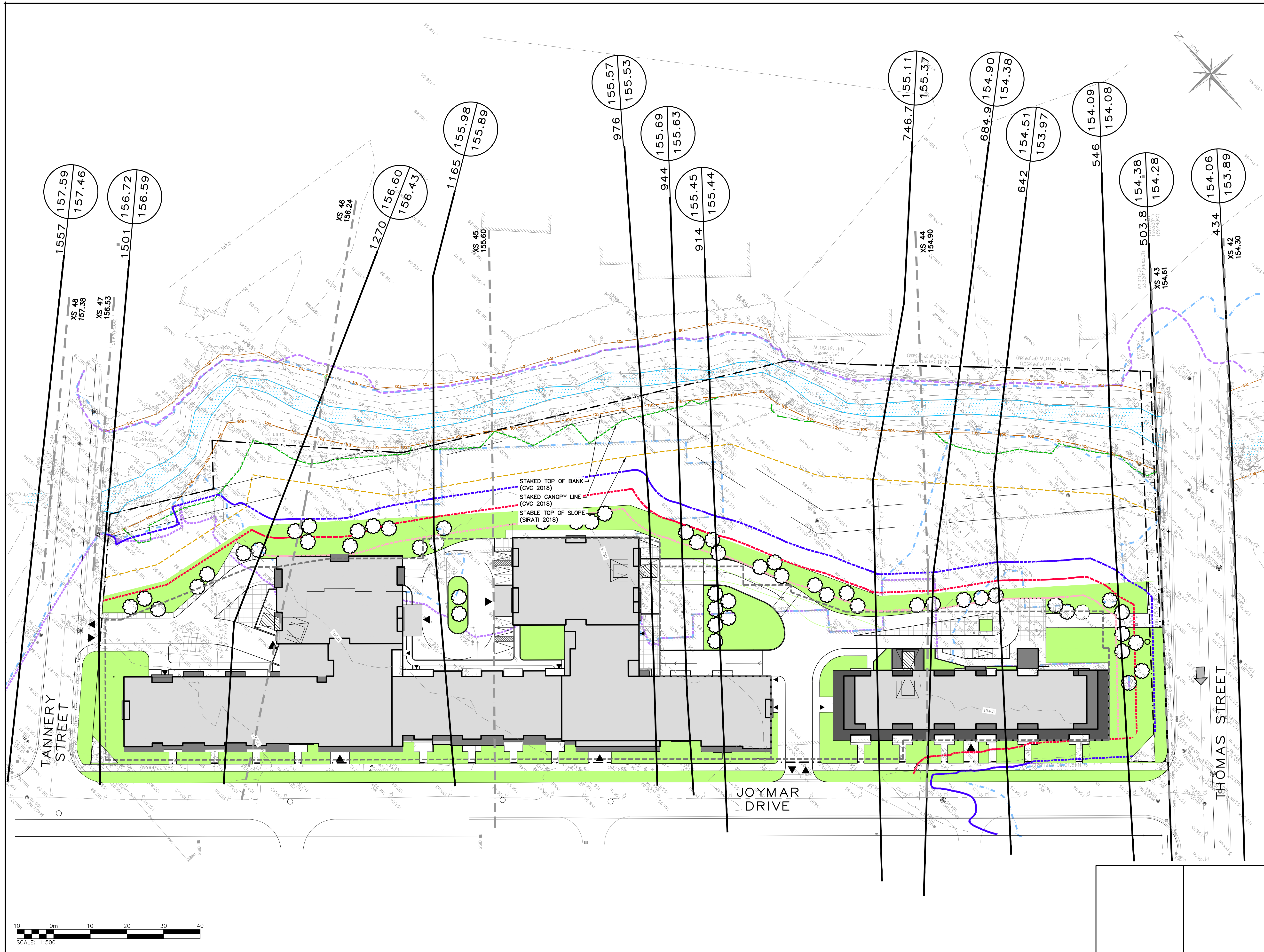
Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
Geom: CFCA_Existing_Conditions
River = Mullet Creek Reach = Reach 1 RS = 434 Cross-Section added by Crozier is extracted from topographic sur



Mullet Creek Plan: 1) CFCA_Existing_Conditions 2) CFCA_Propsoed_Conditions
 River = Mullet Creek Reach = Reach 1 RS = 133 Cross-Section added by Crozier is extracted from the Southwester



Legend	
WS Regional - CFCA_Propsoed_Conditions	▲
WS Regional - CFCA_Existing_Conditions	▲
- CFCA_Propsoed_Conditions	▨
Ground - CFCA_Propsoed_Conditions	■
Ineff - CFCA_Propsoed_Conditions	▲
Bank Sta - CFCA_Propsoed_Conditions	●
- CFCA_Existing_Conditions	▨
Ground - CFCA_Existing_Conditions	■
Ineff - CFCA_Existing_Conditions	▲
Bank Sta - CFCA_Existing_Conditions	●



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING GRADE
- HEC-2 CROSS-SECTIONS (CVC)
- HEC-RAS CROSS-SECTIONS (CROZIER, 2022)
- EXISTING REGIONAL WATER ELEVATION (CROZIER, 2023)
- EXISTING 100-YR. WATER ELEVATION (CROZIER, 2023)
- STAKED CANOPY LINE (CVC, APRIL 5, 2018)
- LONGTERM STABLE TOP OF SLOPE (SIRATI 2018)
- STAKED TOP OF BANK (CVC 2018)
- SPILL POINT

SECTION NUMBER

503.8	154.44	EXISTING REGIONAL WATER ELEVATION (CROZIER, 2022)
	154.34	EXISTING 100-YR. WATER ELEVATION (CROZIER, 2022)

ELEVATION NOTE:
 ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 257 LOCATED ON THE SOUTH FACE, 0.61 METRE WEST OF THE EAST CORNER OF THE RED BRICK BUILDING AT THE NORTHWEST CORNER OF THOMAS STREET AND QUEEN STREET, HAVING AN ELEVATION OF 152.00m CANADIAN GEODETIC VERTICAL DATUM 1928; PRE 1978 ADJUSTMENT.

SURVEY NOTES:
 SURVEY COMPLETED BY DAVID B. SEARLES SURVEYING LTD. (2017/AUG/11) REFERENCE No.: 116-0-16. TOP OF BANK AND CANOPY LINE AS DEFINED BY SITE WALK WITH CVC STAFF (2018/APR/4). SURVEY BY DAVID B. SEARLES (2018/APR/5) BEARINGS ARE GRID BEARINGS DERIVED FROM GPS OBSERVATIONS USING THE SMARTNET NETWORK AND ARE REFERRED TO THE CENTRAL MERIDIAN OF UTM ZONE 17 (8100' WEST), NAD83 (CSRS 2011) BEARINGS ON PLAN SURVEY BY B.J. STASSEN, O.L.S., DATED JUNE 8, 1990 (P1) AND PLAN 43R-16616 (P6) HAVE BEEN ROTATED 0101'10" COUNTERCLOCKWISE TO MAKE COMPARISONS. BEARINGS ON PLAN BY C. PEAT O.L.S., DATED OCTOBER 4, 1967 (P3) HAVE BEEN ROTATED 0053'20" COUNTERCLOCKWISE TO MAKE COMPARISONS. BEARINGS ON TOPO SURVEY BY TONY STAUSKAS, O.L.S., DATED JUNE 9, 2009 (P4) HAVE BEEN ROTATED 0052'20" COUNTERCLOCKWISE TO MAKE COMPARISONS. DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999714.

SITE PLAN NOTES:
 DESIGN ELEMENTS ARE BASED ON SITE PLAN BY 4 ARCHITECTURE INC. DRAWING NAME: TOWNHOUSE RESIDENTIAL SUBDIVISION - 218072 - SITE PLAN, REV.03 (MAR2023) FILE No.: 218072SP01

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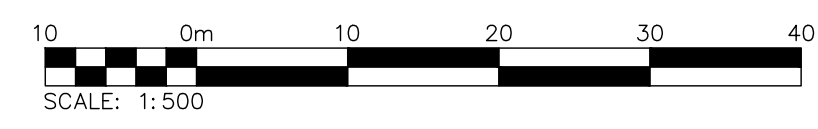
0	ISSUED FOR ZBA SUBMISSION	2024/APR/22
No.	ISSUE / REVISION	YYYY/MM/DD
Project	66 THOMAS STREET CITY OF MISSISSAUGA	
Drawing	EXISTING REGULATORY FLOODLINE AND RELATED HEC-RAS SECTIONS	

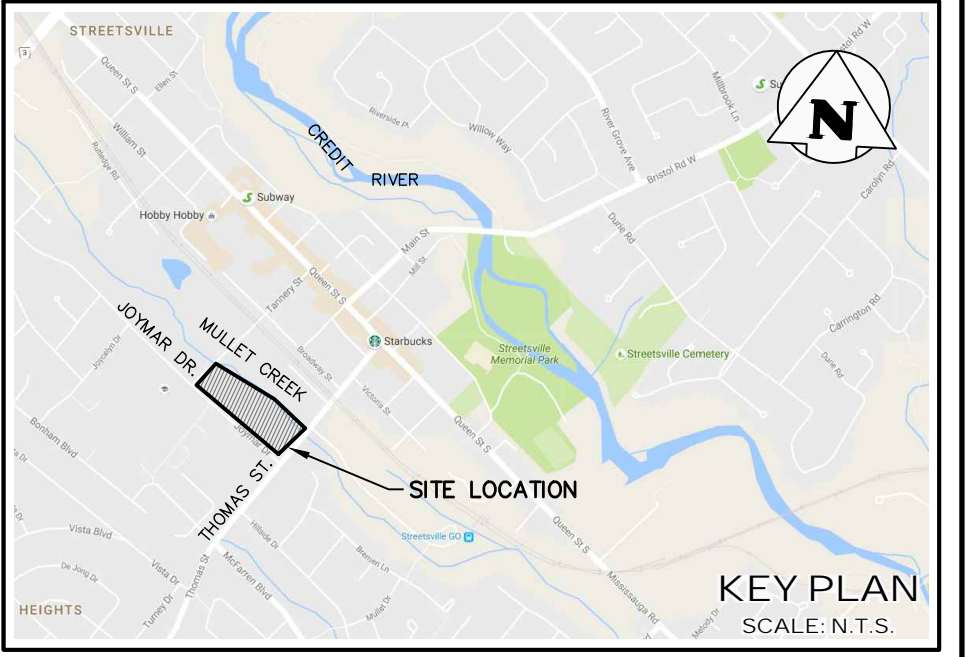
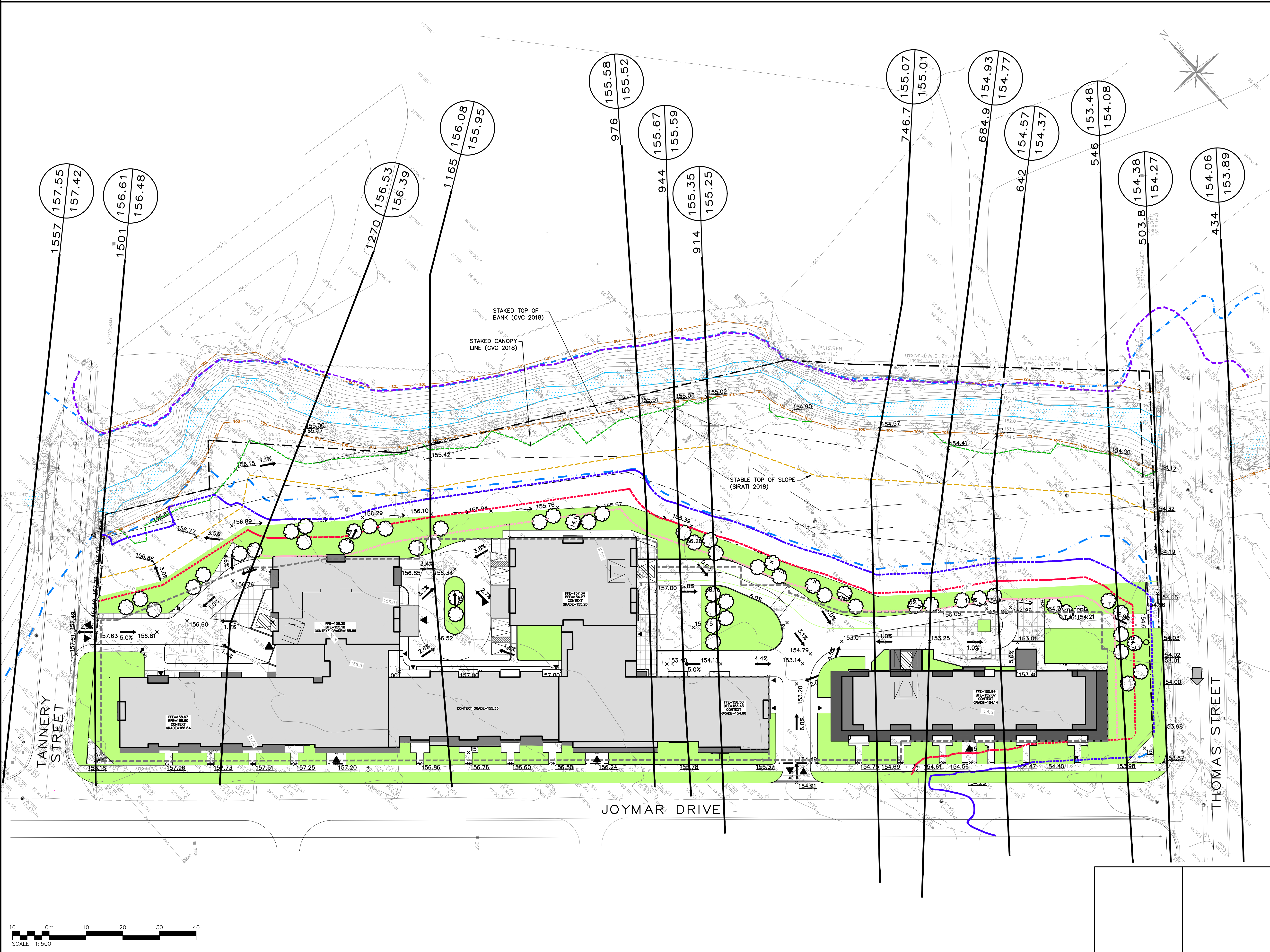
CROZIER & ASSOCIATES
 Consulting Engineers

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 Milton, ON L9T 6P4
 905 875-0026 T
 905 875-4915 F
 www.cfcrozier.ca

Drawn	S.C.	Design	A.R./A.O.	Project No.	1419-4679
Check	R.B.	Check	R.B./J.R.K.	Scale	1:500

FIG 1





LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING GRADE
- - - HEC-RAS Cross-Section (CROZIER, 2023)
- - - PROPOSED REGIONAL WATER ELEVATION (CROZIER, 2023)
- - - PROPOSED 100-YR. WATER ELEVATION (CROZIER, 2023)
- - - PROPOSED DEVELOPMENT LIMIT
- - - ADDITIONAL 5m SETBACK FROM LOD
- - - PROPOSED PROPERTY LINE
- - - PROPOSED LIMIT OF UNDERGROUND PARKING
- - - STAKED CANOPY LINE (CVC, APRIL 5, 2018)
- - - LONGTERM STABLE TOP OF SLOPE (SIRATI 2018)
- - - STAKED TOP OF BANK (CVC 2018)
- x 215.00 PROPOSED GRADE
- x 215.00 PROPOSED GRADE (TO MATCH EXISTING)
- █ SPILL POINT

SECTION NUMBER 503.8

154.42 PROPOSED REGIONAL WATER ELEVATION (CROZIER, 2023)

154.32 PROPOSED 100-YR. WATER ELEVATION (CROZIER, 2023)

ELEVATION NOTE:
 ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 257 LOCATED ON THE SOUTH FACE, 0.61 METRE WEST OF THE EAST CORNER OF THE RED BRICK BUILDING AT THE NORTHWEST CORNER OF THOMAS STREET AND QUEEN STREET, HAVING AN ELEVATION OF 162.08m CANADIAN GEODETIC VERTICAL DATUM 1928: PRE 1978 ADJUSTMENT.

SURVEY NOTES:
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No.	ISSUE / REVISION	YYYY/MMM/DD

Project
66 THOMAS STREET
 CITY OF MISSISSAUGA

Drawing
PROPOSED REGULATORY FLOODLINE AND RELATED HEC-RAS SECTIONS

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Drawn	S.C.	Design	A.R./A.O.	Project No.	1419-4679
Check	R.B.	Check	R.B./J.R.K.	Scale	1:500
				Dwg.	FIG 2

